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Real Estate Management

Dec 28 10 30 AM '98

Montreal, December 21, 1998

STATE OF VERMONT
Agency of Natural Resources
Department of Natural Conservation
Waste Management Division
103 South Main Street/West Office Building
Waterbury, VT 05671-0404

To the attention of: Mr. Chuck Schwer
Supervisor, Sites Management Section

Object: **FORMER STODDARD ENTERPRISES**
3 Wall Street, Northfield, VT
VT DEC Site # 77-0062
CN REM PIN 4770880

Dear Mr. Schwer,

Please find joined a final copy of the Phase II ESA report pertaining to the above referenced property.
As mentioned in an earlier sending (attached), the Phase II ESA conducted by Golder Associates at CN Real Estate Management's request was not restricted to the Stoddard Enterprises lot but rather covered the whole CN property identified as PIN 4770880. The area covered by the present investigation is clearly delineated in the various plans included in this document.
We remain of course available for any question or comment regarding the present.

Regards.

CN Environment – Eastern Region

Yves Decoste
Environment Coordinator

c.c.: Ms. Martine Audet-Lapointe, Corporate manager - Environmental site assessment

Enclosure

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Real Estate Management

Montreal, November 5, 1998

STATE OF VERMONT
Agency of Natural Resources
Department of Natural Conservation
Waste Management Division
103 South Main Street/West Office Building
Waterbury, VT 05671-0404

To the attention of: Mr. Chuck Schwer
Supervisor, Sites Management Section

Object: FORMER STODDARD ENTERPRISES
3 Wall Street, Northfield, VT
VT DEC Site # 77-0062
CN REM PIN 4770880

Dear Mr. Schwer,

The present is in response to your letter addressed to Mr. T.J. Faucett (attached) dated Oct. 30, 1998. As mentioned in your sending, Golder Associates was indeed contracted to conduct a Phase II ESA project on the above referenced property. The field work pertaining to this study was done by Golder during a period spanning from December 1997 to April 1998. A draft report related to this study was submitted to my attention in August 1998. You must therefore understand that we are no longer in a position to submit a proposed work plan to SMS for comments.

The Phase II ESA realized by Golder at CN Real Estate Management's request was not restricted to the Stoddard Enterprises lot but rather covered the whole CN property identified as PIN 4770880. The plans joined show the actual extent of PIN 4770880 as well as the location of the borings/monitoring wells implemented as part of this site assessment work.

The findings of this Phase II ESA could be summarized as follows:

- Based on observations as well as laboratory analytical results, the impacts to subsurface soils appear to be minimal.

- Surface soils have been impacted as evidenced by the concentration of PNA Benzo(a) anthracene in sample 880-SS1 which is slightly in excess of VT DEC Enforcement Standards.

- Impacts to groundwater appear to be minimal across most of the subject property. However, groundwater samples collected from wells 880-MW8 and 880-MW9, located near the center of the bulk fuel storage and distribution operations, contained dichlorobromoethane, 1,1,2-trichloroethane and benzo(a)anthracene at concentrations exceeding the VT DEC Enforcement Standards. The impacted groundwater is believed to be confined to a relatively small area that is bounded to the north, east and South by other monitoring wells.

As mentioned earlier, the Phase II ESA report currently available is a draft version that was commented and returned to Golder Associates for revision on October 4, 1998.

As soon as a final version of the report becomes available, I will forward a copy to your attention for review and comment.

Please feel free to contact me with any further question regarding the present.

Regards.

CN Real Estate - Site assessment

Yves Decoste
Environment Coordinator
Tel: (514)399-7155
Fax: (514)399-7703

c.c.: Mr. T.J. Faucett, Director, Environmental and Asset Management
Ms. Martine Audet-Lapointe, Corporate manager - Environmental site assessment
Ms. Stella Karnis, Environment Coordinator

Enclosure

Golder Associates Inc.

400 Commercial Street
Manchester, NH USA 03101-1113
Telephone (603) 668-0880
Fax (603) 668-1199

PHASE II ENVIRONMENTAL SITE ASSESSMENT REPORT PIN 4770880, MILE 67.61 ROXBURY SUBDIVISION NORTHFIELD, VERMONT

CN Real Estate Management
Montreal, Quebec

November 1998

Project Number 973-6825-002.0004

Submitted to:

CN Real Estate Management
1060 University Street, Suite 10.167
Montreal, Quebec H38 3A2

Prepared by:

Golder Associates Inc.
400 Commercial Street
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(603) 668-0880
(603) 668-1199 (fax)

Golder Associates Inc.

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November 18, 1998

Project No.: 973-6825.002

Mr. Yves Decoste
Environmental Coordinator
1060 University Street, Suite 10.167
Montreal, Quebec H3B 3A2

RE: PHASE II ENVIRONMENTAL SITE ASSESSMENT, PIN 4770880, NORTHFIELD, VERMONT

Dear Mr. Decoste:

Per your request, we have incorporated your draft report comments into the final Phase II Environmental Site Assessment report for the property referenced above. Our investigation has detected soil (880-SS1) with benzo(a)anthracene slightly above Vermont Department of Environmental Conservation (VTDEC) enforcement standards and groundwater (880-MW8) with benzo(a)anthracene and dichlorobromomethane and 1, 1, 2 – trichloroethane (880-MW9) exceeding the standards.

As discussed in Section 5.0 of the report, VTDEC uses primary enforcement standards and USEPA Region III Risk Based Concentrations for qualitatively assessing groundwater quality. VTDEC also uses USEPA Region III Risk Based Concentrations for qualitatively assessing soil quality. The VTDEC Site Management Section (SMS) uses these qualitative standards as part of their two tiered approach in assessing risk. If sampling results are an order of magnitude greater than the qualitative standards, SMS will conclude that an unacceptable risk posed by those compounds may be present at the site and will require additional work to be performed. The additional work could include performance of a site specific quantitative risk assessment, cleanup or monitoring.

Based on the analytical results, detected levels of dichlorobromomethane (3.5 ug/l) and 1,1, 2 – trichloroethane (5.8 ug/l) from 880-MW9 exceed the qualitative enforcement standards (0.17 ug/l and 0.19 ug/l, respectively) by greater than an order of magnitude. A copy of this report should be forwarded to VTDEC for their review and further instructions.

Please contact me at (603) 668-0880 if you have questions or wish to discuss our report further.

Very truly yours,

GOLDER ASSOCIATES INC.

James K. Barrett

James K. Barrett, P. E. LSP
Senior Project Manager

JKB:ram

cc: Bob Malone

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TABLES

FIGURES

APPENDICES

1.0 EXECUTIVE SUMMARY

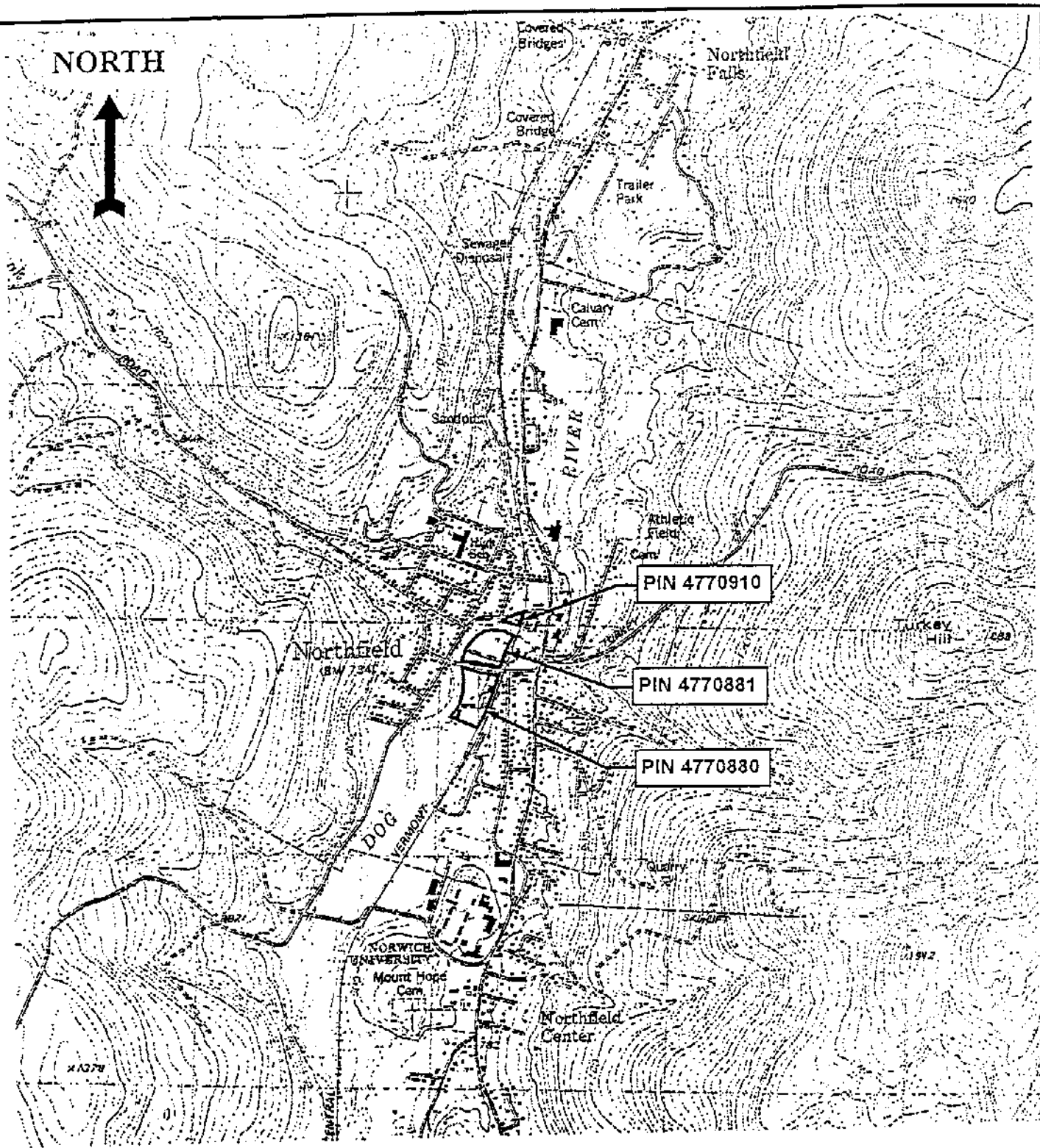
Golder Associates Inc. (Golder) performed a Phase II Environmental Site Assessment (ESA) at PIN 4770880, an 8.55-acre parcel owned by Central Vermont Property, Inc. (CVPI). The ESA field investigation was performed on December 12, 16, and 17, 1997 and April 8 and 9, 1998. PIN 4770880 (the "subject property") is located along the Roxbury Subdivision in Northfield, Washington County, Vermont (Figure 1). The Phase II ESA addressed on-site areas of potential environmental concern (APEC) which included:

- Bulk fuel (coal and oil) storage and ASTs,
- A former lumber operation,
- A former wood preserving business,
- Former underground storage tanks (USTs),
- A lacquer storage building,
- Stockpiled oil-stained soils, and
- Former railroad activity on the subject property.

These APECs were described in detail in the May 14, 1997 report titled "*CN Real Estate Management, CV Properties, Inc., PIN 4770880, South of Wall Street, Northfield, Vermont Phase I Environmental Site Assessment,*" prepared by Heindel and Noyes.

The objective of the Phase II ESA was to assess soil and/or groundwater quality and/or presence of free product by investigating and characterizing soil and groundwater conditions in the vicinity of the APECs and on the subject property in general. This Phase II ESA was completed to facilitate divestment of the subject property by Canadian National Real Estate Management (CNREM) for industrial/commercial use.

A total of eleven (11) borings were drilled to a maximum depth of 27 feet below grade (bg). Discrete soil boring samples were collected during the drilling operation and one sample from each boring was selected and submitted to Philip Analytical Services (Philip) for chemical analysis. Each of the borings were converted to permanent groundwater monitoring wells for



REFERENCE:
BASE MAP TAKEN FROM USGS 7.5 MINUTE QUADRANGLE MAPS TITLED "NORTHFIELD, VT" Original SCALE: 1:24000, DATED 1983

JOB No.	973-6825	SCALE:	1"=2000'
DR. BY:	CDS	DATE:	5/19/98
CHK. BY:		FILE No:	6825-1.PPT
REV. BY:		DR. SUBTITLE:	

GOLDER ASSOCIATES INC.

SITE LOCATION MAP
PIN No. 4770880

WATER ST. NORTHFIELD, VT

Figure 1

the acquisition of groundwater samples and groundwater surface elevation data. In addition, one (1) surface soil sample was collected in an area of noticeably stained surface soils. Due to severe winter conditions, Golder returned to the subject property on April 8 and 9, 1998 to complete a geodetic survey of the installed monitoring wells, and to collect groundwater samples and water table elevation data. Golder collected eleven (11) groundwater samples which were submitted to Philip Analytical Services (Philip) for chemical analysis.

The results of the Phase II ESA indicate the geology of the subject property consists of interfingering sand, silty sand and gravel overlying bedrock. Coal residue was noted near the ground surface in several of the borings. Depth to bedrock varies across the site. Soil borings 880-MW9, 880-MW10, and 880-MW12, located near Wall Street, each encountered bedrock at approximately 6 feet bg. Borings 880-MW11 and 880-MW-12 encountered bedrock at 25 feet bg and 22 feet bg, respectively. Groundwater was encountered during drilling at a depths ranging from 4 feet bg (880-MW7 and 880-MW8) to 16 feet bg (880-MW11). Subsequent groundwater elevation measurements indicate the direction of groundwater flow is to the west-northwest toward the Dog River. The hydraulic conductivity of the silty sands is estimated to be 0.283 feet per day (ft/day) based on the grain size distribution of the soils determined by sieve analysis. An average linear groundwater flow velocity of 0.065 feet per day was calculated.

Based on a review of site history, observations made while on the subject property, and laboratory analytical results, impacts to subsurface soils appear to be minimal. Surface soils have been impacted as evidenced by the concentration of PNAs present in sample 880-SS1, one of which, benzo(a)anthracene, is present at concentrations slightly in excess of Vermont Department of Environmental Conservation (VTDEC) Enforcement Standards. The impacted surface soils do not imply a significant environmental risk due to the relatively low potential for direct contact with the soil. However, given the exceedence observed, it would be prudent to investigate the stained surface soils further and, if necessary, consider removal.

Impacts to groundwater appear to be minimal across most of the subject property. However, groundwater samples collected from wells 880-MW8 and 880-MW9, located near the center of

the bulk fuel storage and distribution operations, contained dichlorobromomethane, 1,1,2-trichloroethane, and benzo(a)anthracene at concentrations which exceed VTDEC Enforcement Standards. The impacted groundwater is believed to be confined to a relatively small area that is bounded on the north, east and south by other monitoring wells. However, no downgradient wells were installed between the area of known impacts and the Dog River, located approximately 200 feet to the west because of shallow bedrock and bedrock outcrops that made well installation in the overburden impossible. Human receptors of the impacted groundwater are unlikely because site businesses receive water from municipal sources and groundwater is not used for other purposes on site. An assessment of impacts to other potential receptors along the Dog River, the likely discharge point for the impacted water, was not included in this scope of work. However, considering the low concentrations of the detected compounds and the extremely low groundwater flow velocity it is not likely that any detectable impacts to the river exist.

2.0 INTRODUCTION

Golder Associates Inc. (Golder) performed a Phase II Environmental Site Assessment (ESA) at PIN 4770906, a 0.88-acre parcel owned by Central Vermont Property, Inc. (CVPI). The ESA field investigation was performed on November 14, and 17, 1997. PIN 4770906 (the "subject property") is located along the Roxbury Subdivision at Mile 39.56 in Bethel, Windsor County, Vermont just west of Main Street and east of the Central Vermont right of way (ROW, Figure 1). This Phase II ESA addressed on-site areas of potential environmental concern (APECs) at PIN 4770906 which include:

- Bulk fuel (coal and oil) storage and ASTs,
- A former lumber operation,
- A former wood preserving business,
- Former underground storage tanks (USTs),
- A lacquer storage building,
- Stockpiled oil-stained soils, and
- Former railroad activity on the subject property.

These APECs are described in detail in the Phase I ESA report referenced above. The only likely off-site APEC identified in the Phase I ESA report included the history of railroad activity on the parcel immediately north of Wall Street (PIN 4770881).

2.1 Site Description

The subject property is a rectangular 8.55-acre parcel located at Mile 67.61 on the Roxbury Subdivision immediately south of Wall Street in Northfield, Washington County, Vermont. (Figures 1 and 2). The property is bounded on the north by Wall Street, on the south by a vacant field, on the east by the Central Vermont Railway right-of-way (ROW) operated by the New England Central Railroad (NECR), and on the west by the Dog River. The United States Geological Survey (USGS) Northfield, VT Quadrangle (7.5-minute series) topographic map (Figure 1) indicates the ground surface of the subject property is approximately 720 feet above

mean sea level (amsl) and slopes gently to the west and north toward the Dog River. The subject property lies within a north-south trending valley surrounded by low hills that rise to elevations in excess of 1900 feet amsl. The Dog River flows past the subject property from south to north, briefly flows east at the north end of PIN 8770881, then turns north to follow the general trend of the valley (Figure 1).

The subject property is currently leased to a several businesses, including Northfield Fuels (lease #10875), Gillespie Fuels (lease #9304), Northfield Telephone Company (no lease information was available in the Phase I ESA prepared by others), Thurston's Market (lease #11055), and Northfield Wood Products (lease #10893). Northfield Fuels and Gillespie Fuels each operate bulk fuel oil storage and distribution businesses and their facilities include several large ASTs and associated distribution piping. The Northfield Telephone Company leases office space. Thurston's Market is a small grocery store. Northfield Wood Products produces finished wood products, including brush and tool handles. Among their facilities is a lacquer storage building.

Site photographs, taken to document conditions encountered and activities undertaken during the Phase II ESA investigation, are presented in Appendix A.

2.2 Summary of Past Studies

The previous environmental studies performed on the subject property include the Phase I ESA conducted by Heindel and Noyes (referenced previously) and an environmental screening report completed by Gemini Geotechnical Associates Inc. (see Appendix 3 of the Phase I ESA report). The review of the previous investigations, the CV Terms of Reference (TOR), and ASTM Standard E1527-97 provided the basis for the development of the objectives and scope of work for this Phase II ESA.

According the Phase I ESA report, the subject property has been in industrial and railroad use since at least 1873. Rail use included construction and use of an engine house, freight house,

coal storage and cord wood storage until 1892. Early industrial use included granite working, a sawmill, and a cannery. A 1903 Sanborn Fire Insurance Map (Sanborn map) shows additional development included a larger granite business, warehouses, and a feed mill. The 1910 Sanborn map shows additional offices, another granite business, and a cider mill. The 1919 Sanborn map shows an expanded feed store and coal sheds. Granite working businesses were maintained on the subject property until 1956.

Early maps indicate the subject property has been used for bulk oil and coal storage since at least 1910. Large above-ground storage tanks were present in the 1910, 1919, and 1925 Sanborn maps. Several companies have leased or subleased the property and maintained bulk fuel storage facilities on the property. Currently, two companies, Northfield Fuels and Gillespie Fuels, operate the facilities.

A wood preservation operation run by Stoddard Enterprises operated near the northeast corner of the property from 1955 to 1959 in a building formerly occupied by one of the granite companies. A preliminary assessment of this property performed in 1988 led to this site being designated as a CERCLIS site. However, the results of the assessment concluded that direct contact with the possible waste material was unlikely and no further investigations are known to have been completed.

The building now occupied by the Northfield Wood Products manufacturing facility may have been constructed as early as 1840 (according to the business owner) as part of a lumber mill. Several lumber businesses, as well as a meat packing house and cannery, occupied the building from 1911 to 1920. Northfield Wood Products also uses the former locomotive house as a lumber warehouse. The locomotive house was built prior to 1873, but was not used for the intended purpose by 1903. A railroad freight house was also built prior to 1873 and has been used as a warehouse for most of its history. A hardware store occupied the freight house from 1988 to 1992, but is currently used by the Northfield Telephone Company for office space.

The building currently occupied by Thurston's Market was built between 1903 and 1910 for use as an office. Over the years it has been used for grain storage, as a grocery store, and as a

grain and feed store. The north end of the building is occupied by the market, the south end by the offices of Northfield Fuels, with a small car wash facility in between.

According to the Phase I ESA report, a 1000-gallon fuel oil UST was removed from the Northfield Wood Products site in 1985. The owner reported that no contamination was encountered. In 1995, a 1000-gallon diesel fuel UST was removed from near the southeast corner of the Northfield Fuels office. Contaminated soils were encountered, excavated, and stockpiled on site where they are reportedly undergoing biodegradation. According to the Gemini Geotechnical Associates report, numerous 55-gallon drums were visible on the subject property, some of which were observed to be leaking onto the ground surface. These drums had been removed some time before the Phase II ESA fieldwork was begun. Stained surface soils were noted in several areas.

2.3 Project Objectives and Scope of Work

The stated objectives for the Phase II ESA per the TOR as they relate to the identified concerns in the Phase I ESA of the subject property were to:

1. Investigate and characterize soil and groundwater conditions related to the areas of potential environmental concern (APECs) identified during the Phase I ESA of the subject property;
2. Identify the possible off-site or on-site migration of contaminants and determine the presence or absence of free phase petroleum products;
3. Determine the groundwater flow directions and rates; and
4. Identify the potential for off-site migration of free product, if present.

In order to accomplish the above-referenced objectives, the following scope of services was executed by Golder:

Task 1 - Review of Existing Data and Information

This task involved the review of the Phase I ESA reports referenced above, as well as any pertinent documentation associated with specific APECs that may not have been included with the Phase I ESAs or other file documentation.

Task 2 - Subsurface Investigation

The subsurface investigation executed by Golder consisted of infrastructure elevation, depth-specific soil sampling, groundwater level measurement and groundwater sampling.

Subtask 2-1 - Infrastructure Evaluation

Any structures, foundations, or paved sub-base layers, which may have an influence on the groundwater flow direction and may provide a potential preferential pathway for contaminant migration, were located and identified during the Phase II ESA field investigation. Information pertinent to the potential migration of identified groundwater impacts are included on site maps and are discussed in this Phase II ESA report.

Subtask 2.2 - Soil Borings/Permanent Wells

Eleven (11) soil borings were drilled during the Phase II ESA. Each of the borings were drilled for the purpose of collecting depth-specific soil samples and to install permanent monitoring wells for groundwater sampling and water level measurement.

Actual soil sample intervals were selected in the field and were based on physical descriptions of the sample lithology, field screening for indications of contamination, and degree of saturation. One groundwater sample was collected from each well.

Task 3 - Data Evaluation

Upon completion of Task 2 and receipt of all analytical data from Philip, Golder performed routine validation activities to verify the representativeness of the results. Following the validation efforts, all geologic/hydrogeologic observations and analytical data were evaluated to: 1) confirm the presence of exceedences of relevant criteria; 2) assess the probability of a connection between any exceedences of relevant criteria detected and previously identified APECs and, 3) estimate the likely direction(s) of groundwater flow and contaminant migration and the potential for off-site contaminant transport. Golder also compared detected chemical concentration levels to Vermont Department of Environmental Conservation Enforcement Standards for soil and groundwater.

Task 4 – Reporting

Golder utilized the data and information gathered during completion of Tasks 1 through 3 to develop this written report which describes the site, the areas investigated, methodologies employed, and the results of the investigation as they pertain to the objectives of the Phase II ESA.

The sampling and analysis plan designed for the subject property is presented in Table 1, which summarizes the areas of potential environmental concern (APECs), the proposed number of soil borings and monitoring wells, the proposed number of soil and groundwater samples, and the recommended analyses for each soil and groundwater sample.

TABLE 1

SAMPLING AND ANALYSES

PIN 4770880

Subdivision	PIN	AOECs	Concerns	Soil Borings	Temporary Monitoring Wells	Permanent Monitoring Wells	Subsurface Soil Samples	Ground-water Samples	Surface Soil Samples	UST Survey/ Potential Removal	ANALYTICAL RECOMMENDATIONS											
											Subsurface Soils				Surface Soils				Groundwater Samples			
											PNA	VOC	BTEX	Metals	PNA	VOC	BTEX	Metals	PNA	VOC	D/C	Metals
Roxbury	4770880 Northfield, VT	Bulk fuel distributors, wood preservation and wintering, paint use as a railroad freight house	Potential petroleum hydrocarbon, dioxins and chlorophenols contamination																			
				11		11	11	11	1	No	11	11	0	0	1	1	0	0	11	11	0	0
Total:				11	0	11	11	11	1		11	11	0	0	1	1	0	0	11	11	0	0
TOTAL WITH QA/QC SAMPLES:											13	13	0	0	1	1	0	0	13	13	0	0

NOTES:

PNA: Polycyclic aromatic hydrocarbons (USEPA Method 8270)
VOC: Volatile organic compounds (USEPA Method 8260)
BTEX: Benzene, toluene, xylenes (USEPA Method 8020 or 8260)
Metals: (USEPA Methods Series 6000/7000)
PCBs: Polychlorinated biphenyls (USEPA Method 8080)
D/C: Dioxins and chlorophenols

3.0 FIELD INVESTIGATION METHODOLOGY

Golder performed the subsurface soils and groundwater investigations at the subject property on December 14, and 17, 1997. A summary of the samples collected, sampling locations and analyses performed are presented in Table 2.

3.1 Soil Sampling

One shallow surficial soil sample 880-SS1 was collected in the vicinity of a currently unused pump house owned by Northfield Fuels (Figure 2). The soil sample was collected from the ground surface to a depth of 0.5 feet below grade (bg) in a small area (less than five feet diameter) of stained soils.

3.1.1 Soil Borings

Eleven (11) soil borings were drilled under Golder supervision on December 12, 16, and 17, 1997 by Capital Environmental Drilling Services, Inc. of Dunbarton, New Hampshire using a CME 550X all terrain drilling rig with 4-1/4 inch hollow stem augers (see Figure 2 for boring locations). The borings were located to evaluate the soil and groundwater conditions in the vicinity of the APECs and the subject property in general.

Subsurface soil samples were generally collected at 5.0-foot intervals in borings 880-MW1 through 880-MW12 (excluding 880-MW4 which was not drilled due to shallow bedrock) using a 2.0-inch diameter, 2.0-foot long, split spoon sampler. In boring 880-MW2, subsurface samples were collected continuously to the total depth of 12 feet bg. Total depth of the borings ranged from seven (7) feet bg to 27 feet bg. Groundwater was encountered in these borings at depths ranging from approximately four (4) feet bg near the bedrock outcropping west of the Northfield Fuel ASTs to approximately 16 feet bg near the northeast corner of the subject property. Soil boring logs are provided in Appendix B. Upon retrieval from the borehole, each sample was visually inspected for stains, odors, etc., geologically classified and field screened

TABLE 2
BOREHOLE LOCATIONS AND SAMPLES SUBMITTED
PIN 4770#880

Borehole I.D.	Site Location	APEC	Soil Interval Sampled (ft)	PID Reading (ppm)	Submitted For Analysis (yes/no)	Requested Soil Analysis	Monitor Well Installed (yes/no)	Requested Groundwater Analysis
880-MW1	Southwest area of PIN	Former lumber operation	0-2 5-7* 10-12	1.2 1.1 0.5	No Yes No	PNAs & VOCs	Yes 880-MW1	PNAs & VOCs
880-MW2	Center of PIN	Former UST	0-2 2-4 4-6* 6-8 8-10 10-12	1 0.1 0.4 0 0 0.8	No No No No No Yes	PNAs & VOCs	Yes 880-MW2	PNAs & VOCs
880-MW3	West side of PIN	Former lacquer storage building	0-2 5-7*	0.1 0	No Yes	PNAs & VOCs	Yes 880-MW3	PNAs & VOCs
880-MW5	Near center of PIN	Former USTs	0-2* 5-7 10-12	0 0 0	No No Yes	PNAs & VOCs	Yes 880-MW5	PNAs & VOCs
880-MW6	East side of PIN	Former stockpiled oil-stained soils	0-2 5-7 10-12* 15-17 20-22	0 0 0 0.4 0.5	No No No No Yes	PNAs & VOCs	Yes 880-MW6	PNAs & VOCs
880-MW7	Near center of PIN	Former pumphouse and ASTs	0-2* 5-7 10-12 14-16	0 94 1.1 0.4	No Yes No No	PNAs & VOCs	Yes 880-MW7	PNAs & VOCs
880-MW8	Near center of PIN	ASTs	0-2* 5-7 10-12	0 0.3 0.9	No No Yes	PNAs & VOCs	Yes 880-MW8	PNAs & VOCs

Borehole I.D.	Site Location	APEC	Soil Interval Sampled (ft)	PID Reading (ppm)	Submitted For Analysis (yes/no)	Requested Soil Analysis	Monitor Well Installed (yes/no)	Requested Groundwater Analysis
880-MW9	Near north portion of PIN	ASTs	0-2* 5-7	3.6 82	No Yes	PNAs & VOCs	Yes 880-MW9	PNAs & VOCs
880-MW10	Near north PIN boundary	ASTs	0-2* 5-7	0.5 0.8	No Yes	PNAs & VOCs	Yes 880-MW10	PNAs & VOCs
880-MW11	Near north east corner of PIN	Upgradient location	0-2 5-7 10-12 15-17* 20-22 25-27	0.5 0.4 0.2 0.2 0.1 0	No No No Yes No No	PNAs & VOCs	Yes 880-MW11	PNAs & VOCs
880-MW12	Near north boundary of PIN	ASTs	0-2* 5-7	0.1 0.1	No Yes	PNAs & VOCs	Yes 880-MW12	PNAs & VOCs

Notes:

PNA: Polynuclear Aromatic Hydrocarbons (USEPA Method 8270)

VOC: Volatile Organic Compounds (USEPA Method 8260)

BTEX: Benzene, Toluene, Ethylbenzene, Xylenes (USEPA Method 8240)

Metals: USEPA Method Series 6000/7000

NA: Not Analyzed

* Groundwater encountered

with an organic vapor meter [photoionization detector (PID), Thermo Environmental Instruments Model 580B]. Sample descriptions and classifications were made using the Unified Soil Classification System. PID readings and any odors were noted on field logs and are summarized on the boring logs in Appendix B and in Tables 2, 4, and 5. In general, very low organic vapor readings (less than 5 ppm) were noted in each boring. These readings may not necessarily be indicative of the presence of organic vapors, but may be instrument responses to high humidity, the presence of water vapor in the soil samples, or very cold weather conditions. The only exceptions to this trend were higher PID readings recorded during the drilling of borings 880-MW7 (94 ppm) and 880-MW9 (82 ppm). No other indicators of potential contamination were noted during the drilling and sampling process. Therefore only one sample from each boring was submitted to the laboratory for VOCs and PNA analysis. A total of 38 subsurface soil samples were collected from the borings and 11 (plus one duplicate sample) were submitted to the laboratory for analyses (Table 2).

3.2 Permanent Monitoring Well Installation

Permanent monitoring wells were installed in each of the 11 borings. These were designated 880-MW1 through 880-MW3 and 880-MW5 through 880-MW12. Monitoring well 880-MW4 was not installed because auger refusal on bedrock at 3.0 to 5.0 feet bg was encountered after several attempts. The wells were constructed of two-inch diameter PVC risers and two-inch diameter, ten-foot long PVC screens (0.010 inch slot size). The screens were positioned in each boring to straddle the water table and silica sand was inserted into the annular space between the screen and the inner surface of the hollow stem augers. The sand pack was inserted as the augers were removed until it extended to approximately one foot above the top of the well screen. A two-foot thick layer of bentonite pellets was placed on the sand pack and the remaining annulus was backfilled with native soils produced during drilling. A steel, flush-mount, protective monument was cemented in place over each well head and secured with a padlock. Monitoring well diagrams are included with the borehole logs located in Appendix B.

3.2.1. Groundwater Sampling and Water Level Measurement

Groundwater samples were collected from each of the monitoring wells on April 9, 1998. Each well was developed and purged using a dedicated PVC bailer to remove greater than three well volumes of standing water. Sampling was initiated after development by inserting the bailer into the screened interval of each monitoring well. The unfiltered groundwater samples were collected in the appropriate containers supplied by Philip and placed on natural ice to maintain a temperature of approximately 4°C. Each sample was analyzed as shown in Table 1. Sample analytical results are summarized in Table 4 and 5. Completed chain-of-custody forms and the analytical results are provided in Appendix E.

Depth to groundwater was measured to the nearest 0.01 feet in each well after its completion, just prior to its development and during the elevation surveys (Section 3.3).

3.3 Surveying

The top of casing of each monitoring well was surveyed to determine its elevation with respect to a local datum point (benchmark) established on the subject property. The benchmark, located on the concrete slab near the southeast corner of the Northfield Fuels offices (Figure 2), was assigned an arbitrary elevation of 100.00 feet to which all monitoring well elevations were referenced. Survey results are summarized in Table 3.

3.4 Quality Control

Sample collection quality control measures included adherence to US EPA sample handling and chain-of-custody procedures. Chain-of-custody procedures included noting the sampler's name, signature, sample identification, collection time and date and requested analyses listed on the sample bottle and chain-of-custody form. One (1) duplicate soil sample (880-MW2 DUP) was collected and submitted from PIN 4770880.

Laboratory QA/QC is described in Section 5.3.

3.5 Decontamination

All drilling equipment and associated tools were decontaminated between each boring location and the split spoon samplers were decontaminated after each use. Drilling equipment and steel tools were thoroughly decontaminated using high-pressure steam. All sampling devices were thoroughly cleaned using a scrub brush with water and Alconox detergent followed by a double rinse with clean potable water.

TABLE 3

WATER TABLE AND SCREEN ELEVATIONS

PIN 4770880

Well	Ground Elevation (feet)	Top of Casing Elevation (feet)	Static Water Level (feet btoc)	Groundwater Elevation (feet)	Elevation of Screened Interval (feet)
880-MW1	90.86	90.61	4.03	86.58	87.36 - 77.36
880-MW2	103.40	102.99	5.85	97.14	99.90 - 89.90
880-MW3	100.82	100.40	6.07	94.33	96.82 - 87.82
880-MW5	102.46	102.18	3.23	98.95	99.46 - 89.46
880-MW6					
880-MW7	101.01	100.64	1.81	98.83	98.01 - 88.01
880-MW8	100.12	99.83	0.86	98.97	97.12 - 87.12
880-MW9	99.80	99.55	1.11	98.44	97.30 - 94.30
880-MW10	100.04	99.67	2.37	97.30	98.04 - 94.04
880-MW11					
880-MW12	99.65	99.39	2.41	96.98	96.65 - 93.65

Notes:
btoc below top of casing
Wells 880-MW6 and 880-MW11 could not be located due to deep snow and ice on the ground surface.
BM-1 is located on the concrete slab at the southeast corner of the original structure of Northfield Fuels.
All elevations are relative to an arbitrary elevation of 100 feet assigned to benchmark BM-1.

3.6 Variations from Proposed Investigation

Groundwater was encountered at depths much less than 20 feet bg. Therefore drilling of these borings was terminated prior to reaching the target depth of 20 feet. In addition, many of the borings encountered refusal at depths less than the target depth of 20 feet bg. Only borings 880-MW6 (22 feet bg) and 880-MW11 (25 feet bg) were extended beyond 20 feet bg.

Each of the monitoring well screens were installed so as to straddle the water table encountered during drilling operations. After the geodetic survey and water level measurements were completed in April 1998, it was discovered that the water table extended above the top of the screen (by up to 1.85 feet) in wells 880-MW7, 880-MW8 and 880-MW9. The high water table elevation is likely due to spring snow melt and give that no confining layers were noted between the ground surface and the screened intervals, it is unlikely that these screen placements will have a significant detrimental effect on the accuracy of water level measurements within these wells.

No other variations from the proposed investigation were required.

4.0 PHYSICAL CHARACTERISTICS OF THE SITE

The physical characteristics of the subject property are described in the following sections. The regional geology and soils information were determined from the *Surficial Geologic Map of Vermont* (1970), the *Centennial Geological Map of Vermont* (1961), *Geology for Environmental Planning in the Barre-Montpelier Region, Vermont* (1971), US Department of Agriculture soils maps, and information compiled for the Phase I ESA report (1997). Local subsurface geologic, hydrologic and hydraulic information was derived from the on-site observations and geotechnical testing conducted as part of the Phase II ESA.

4.1 Regional Geology

According to the *Surficial Geological Map of Vermont* (1970) and *Centennial Geologic Map of Vermont* (1961) the regional geology of the subject property and its surroundings is dominated by glacial and post-glacial sedimentary deposits. The hills surrounding the Dog River valley consist of glacial till mantling bedrock. The till is typically thicker in the valleys and thinner in the highlands. The river valleys contain a combination of glaciolacustrine and fluvial deposits of bedded gravels and sands, as well as occasional bedrock exposures and more recent alluvial deposits. According to *Geology for Environmental Planning in the Barre-Montpelier Region, Vermont* (1971), the Dog River Valley is filled with 50 to 60 feet of sediments. Bedrock under the region generally consists of low- to medium-grade metamorphic rocks that have undergone complex folding and fracturing. Bedrock underlying the subject property consists of the Cram Hill Member of the Missisquoi Formation, a phyllite which grades locally to a dark slate. The soil survey sheet for this area, developed by the U.S. Department of Agriculture, describes the soils as a Windsor to gravelly-Windsor-type. These soils are described as excessively drained, sandy, gravelly soils low in lime and found on terraces along rivers and creeks. These soils are typically deep and found on level- to sloping terrain.

4.2 Local Geology

The subsurface investigation results indicate the surficial geology of the subject site consists of a series of interfingering layers of brown or gray silty fine to medium sand with little gravel overlying a shallow bedrock surface. Coal residue was encountered near the surface in borings 880-MW6 through 880-MW9 which were located on or near the Northfield Fuels and Gillespie Fuels parcels. Solid bedrock was encountered at approximately 6 feet bg in borings 880-MW9, 880-MW10 and 880-MW12. Weathered bedrock was encountered at depths as shallow as two (2) feet bg in these borings which are located near a shale outcropping near the center of the property (Figure 2). In the northeast corner of the property, boring 880-MW11 encountered bedrock at 25 feet bg. This suggests a downward-sloping bedrock surface toward the center of the valley. The stratigraphy encountered in the borings is graphically presented in the borehole logs presented in Appendix B and in cross-sections presented in Figures 4 and 5. The locations of transects used to develop geologic cross-sections of the subject property are shown in Figure 2.

4.3 Hydrogeology

Groundwater was encountered at depths ranging from approximately one (1) foot bg to approximately 6 feet bg. Based upon the depth of the water table and the depth to bedrock encountered during drilling operations, the saturated thickness of the shallow water-bearing deposits underlying the subject property is at ranges from approximately three (3) feet to nearly 12 feet. A more detailed assessment of the depth to bedrock or the saturated thickness was not conducted because no indications of contamination were encountered in the field that warranted deeper exploration.

Surveyed monitoring well elevations and corresponding groundwater table and screen interval elevations are presented in Table 3. All measurements were made relative to a local survey datum established on the subject property. Based on the groundwater surface elevation measurements, a northwesterly groundwater flow direction is implied (Figure 3), and a relatively flat gradient of 0.067 feet per linear foot (ft/ft) can be calculated. The likely discharge point for the shallow groundwater is the Dog River, located immediately adjacent to

the subject property along the western property line. Relative groundwater elevations and presumed direction of groundwater flow is shown in Figure 3. Groundwater elevations are also shown on the cross-sections presented in Figure 4 and 5.

4.4 Hydrology

Based on the site reconnaissance and information provided on the USGS Northfield VT topographic map (see Figure 1), the ground surface at the subject property is approximately 720 feet above mean sea level and slopes gently to the north and northwest toward the Dog River.

The subject property is located within the Dog River Drainage Basin (Figure 1) which trends approximately northeast-southwest in the vicinity of the subject property. Small creeks and streams draining the hills to the east and west control surface water flow in the area. Drainage across the subject property is primarily controlled by the moderate slope across the property toward the Dog River. The ground surface has been altered considerably over the years and local flow patterns can be expected to differ from the regional norm. Due to the relatively permeable nature of the soils underlying the site, the subject property appears to be well drained.

4.5 Hydraulic Conductivity

The hydraulic conductivity (K) of the saturated silty sands encountered on the subject property was estimated using grain size analyses and criteria developed by Freeze and Cherry (1979). A representative sample of the primary shallow water-bearing zone encountered in the borings at PIN 4770880 was collected and tested following ASTM Standard Test Method for Sieve Analysis (C117-90 and C136-93). The sample was collected as a composite from the 3.0 to 7.0 foot depth interval from boring 880-MW1. The sieve analysis indicated this material is composed of gravelly silty sand. Specifically, the sieve analysis revealed the sampled material is comprised of 49.7% sand, 15.3% gravel and 35% fines (Appendix C). The estimated K value is approximately $1x10^{-4}$ cm/sec (0.283 ft/day) based upon the Freeze and Cherry criteria (Appendix D).

Estimates of the groundwater velocity and flow direction were made based on the monitoring well location surveys, groundwater elevation surveys and the K value estimates (Appendix D). As shown in Figure 3 groundwater flows from the subject property in a northwesterly direction. Groundwater velocity was calculated using:

$$V = \frac{Ki}{n}$$

where:

V is the average velocity,
K is the hydraulic conductivity (0.283 ft/d),
i is the hydraulic gradient determined from Figure 3 (0.066 ft/ft) and,
n is the effective porosity (0.29).

Based on the groundwater elevations shown in Figure 3, the groundwater gradient across much of the subject property has been estimated at a maximum of 0.067 feet/linear foot. Effective porosity is estimated based on methods developed by de Marsily (1986). Assuming an effective porosity of 0.29, and a K-value of $1x10^{-4}$ cm/sec, these calculations indicate the estimated groundwater flow velocity beneath the subject property is approximately 0.065 ft/day.

4.6 Site Infrastructure

There are several structures on the subject property. According to the Phase I ESA report, most of these buildings were constructed on concrete slabs or on a dirt floor. However, the Thurston's Market building reportedly includes a cellar and a septic system. One of the Northfield Wood Products buildings includes a partial basement. The car wash behind Thurston's Market drains to a dry well. The Gillespie Fuels office building also has a septic system. Given the very high groundwater level (1 to 6 feet bg) encountered at the subject property, it is likely that all of these structures could alter local groundwater flow patterns either by impeding flow, or by providing a significant seasonal influx of water to the groundwater system. The dry well under the car wash has the potential to provide a significant influx of water and potential contaminants to the shallow groundwater system. However, this would only be expected during the warmer summer months of the year.

5.0 DATA AND ANALYSIS

The following sections present the results of the laboratory analyses of subsurface soil, groundwater and surficial soil samples collected during this Phase II ESA and the criteria used to assess the significance of the analytical results. Laboratory reports and chain of custody forms are provided in Appendix E.

5.1 Assessment Criteria

The Vermont Department of Conservation (VTDEC) uses primary groundwater enforcement standards for qualitatively assessing groundwater quality. Analytes not included in the primary groundwater standards are compared to the USEPA Region III Risk-Based Concentrations (exposure via tap water) as an initial screening even though groundwater at a given site may not be used as a water supply. Quantitative standards may be required by VTDEC based on a site-specific risk assessment to estimate the potential for risks of harm to health and public welfare. VTDEC also uses the USEPA Region III Risk-Based Concentrations for qualitatively assessing soil quality (based on ingestion) even though onsite soils are not being consumed. These qualitative soil standards are provided for industrial and residential site use. Current and historic use for the site has been industrial/commercial. Based on current zoning, the continued industrial/commercial use of the property in the foreseeable future is expected. Quantitative soil standards may be required based on site-specific risk assessment to estimate the potential for risk of harm to health and public welfare. VTDEC also allows direct PID screening of soils contaminated with gasoline, fuel oils and used oil if the contaminant source is known. Soils contaminated with waste oil or heavier petroleum products such as #4 or #6 fuel oil or at sites where the contaminant is uncertain must be evaluated by laboratory analysis.

5.2 Soil and Groundwater Results

The soil and groundwater analytical data obtained during the subsurface investigation of the subject property are summarized below. Analytical results and standards used as the assessment criteria are presented in Table 4 (PNA Analytical Results) and Table 5 (VOC Analytical

TABLE 4
PHASE II ESA
PNA SAMPLE RESULTS (GROUNDWATER)
NORTHFIELD PIN 4770880

PARAMETER	VTDEC Enforcement Standards* Water µg/L	VTDEC Enforcement Standards* Soil mg/Kg	MW1-880 Water µg/L	MW2-880 Water µg/L	MW3-880 Water µg/L	MW5-880 Water µg/L	MW6-880 Water µg/L	MW7-880 Water µg/L	MW8-880 Water µg/L	MW9-880 Water µg/L	MW10-880 Water µg/L	MW11-880 Water µg/L	MW12-880 Water µg/L	METHOD DETECTION LIMIT Water µg/L	METHOD DETECTION LIMIT Soil mg/kg
Naphthalene	1,500	82,000	U	U	U	U	U	U	U	61	U	U	U	0.3	0.03
Acenaphthylene	NS	NS	U	U	U	U	U	U	U	U	U	U	U	0.4	0.04
Acenaphthene	2,300	120,000	U	U	U	U	U	U	U	4.0	U	U	U	0.7	0.07
Fluorene	1,500	82,000	U	U	U	U	U	U	U	11	U	U	U	0.3	0.03
Phenanthrene	NS	NS	U	U	U	U	U	U	U	15	U	U	U	0.3	0.03
Anthracene	11,000	610,000	U	U	U	U	U	U	U	U	U	U	U	0.3	0.03
Fluoranthene	1,500	82,000	U	U	U	U	U	U	0.4	0.4	U	U	U	0.2	0.02
Pyrene	1,100	61,000	U	U	U	U	U	U	0.5	1.2	U	U	U	0.3	0.03
Benzo(a)anthracene	0.092	7.8	U	U	U	U	U	U	0.3	U	U	U	U	0.2	0.02
Chrysene	9.2	780	U	U	U	U	U	U	0.4	U	U	U	U	0.3	0.03
Benzo(b)fluoranthene	0.092	7.8	U	U	U	U	U	U	U	U	U	U	U	0.4	0.04
Benzo(k)fluoranthene	0.92	78	U	U	U	U	U	U	U	U	U	U	U	0.4	0.04
Benzo(a)pyrene	0.0092	.78	U	U	U	U	U	U	U	U	U	U	U	0.5	0.05
Indeno(1,2,3-cd)pyrene	0.092	78	U	U	U	U	U	U	U	U	U	U	U	0.6	0.04
Dibenzo(ah)anthracene	0.0092	.78	U	U	U	U	U	U	U	U	U	U	U	0.4	0.04
Benzo(ghi)perylene	NS	NS	U	U	U	U	U	U	U	U	U	U	U	0.4	0.04

Notes:
Samples analyzed using EPA Method 8270 (SVOCs)
*Qualitative screening standards based on USEPA Region III Risk Based Concentrations Table (exposure via tap water or soil ingestion)
** Industrial soil ingestion standards

U - Parameter not detected above identified reporting limit
L - Parameter present, reported value may be biased low
UL - Parameter not detected, quantitation limit may be biased low
J - Parameter present, reported value may be inaccurate or imprecise
UJ - Parameter not detected, quantitation limit may be inaccurate or imprecise

TABLE 4
PHASE II ESA
PNA SAMPLE RESULTS (SURFICIAL SOILS + BORINGS)
NORTHFIELD PIN 4770880

PARAMETER	VTDEC Enforcement Standards* Water µg/L	VTDEC Enforcement Standards* Soil mg/Kg	SS1-880 Soil mg/kg	MW1-880 (5-7) 1.1[1] Soil mg/kg	MW2-880 (10-12) 0.8 Soil mg/kg	MW2-880 DUP Soil mg/kg	MW3-880 (5-7) 0 Soil mg/kg	MW5-880 (10-12) 0 Soil mg/kg	MW6-880 (20-22) 0.5 Soil mg/kg	MW7-880 (5-7) 94 Soil mg/kg	MW8-880 (10-12) 0.9 Soil mg/kg	MW9-880 (5-7) 82 Soil mg/kg	MW10-880 (5-7) 0.8 Soil mg/kg	MW11-880 (15-17) 0.2 Soil mg/kg	MW12-880 (5-7) 0.1 Soil mg/kg	METHOD DETECTION LIMIT Water µg/L	METHOD DETECTION LIMIT Soil mg/kg
Naphthalene	1,500	82,000	0.23	0.030	U	U	U	U	U	13	U	0.11	U	U	U	0.3	0.03
Acenaphthylene	NS	NS	0.08	U	U	U	U	U	U	<4.0	U	U	U	U	U	0.4	0.04
Acenaphthene	2,300	120,000	U	U	U	U	U	U	U	<7.0	U	U	U	U	U	0.7	0.07
Fluorene	1,500	82,000	0.08	U	U	U	U	U	U	9.6	U	0.11	U	U	U	0.3	0.03
Phenanthrene	NS	NS	1.4	0.27	U	U	U	U	U	20	0.04	0.36	U	U	U	0.3	0.03
Anthracene	11,000	610,000	0.18	0.04	U	U	U	U	U	<3.0	U	0.06	U	U	U	0.3	0.03
Fluoranthene	1,500	82,000	1.9	0.45	U	U	U	U	U	<2.0	0.07	0.17	U	U	U	0.2	0.02
Pyrene	1,100	61,000	1.3	0.37	U	U	U	U	U	<3.0	0.06	0.11	U	U	U	0.3	0.03
Benzo(a)anthracene	0.092	7.8	0.77	0.17	U	U	U	U	U	0.14	0.04	0.06	U	U	U	0.2	0.02
Chrysene	9.2	780	1.1	0.29	U	U	U	U	U	0.21	0.04	0.06	U	U	U	0.3	0.03
Benzo(b)fluoranthene	0.092	7.8	0.98	<0.41	U	U	U	U	U	0.06	<0.05	U	U	U	U	0.4	0.04
Benzo(k)fluoranthene	0.92	78	0.75	<0.42	U	U	U	U	U	U	<0.05	0.06	U	U	U	0.4	0.04
Benzo(a)pyrene	0.0092	.78	0.79	0.18	U	U	U	U	U	U	U	0.06	U	U	U	0.5	0.05
Indeno(1,2,3-cd)pyrene	0.092	78	0.68	0.17	U	U	U	U	U	U	U	U	U	U	U	0.6	0.04
Dibenzo(ah)anthracene	0.0092	.78	0.11	U	U	U	U	U	U	U	U	U	U	U	U	0.4	0.04
Benzo(ghi)perylene	NS	NS	0.55	0.17	U	U	U	U	U	U	U	U	U	U	U	0.4	0.04

Notes:
Samples analyzed using EPA Method 8270 (SVOCs)
*Qualitative screening standards based on USEPA Region III Risk Based Concentrations Table (exposure via tap water or soil ingestion)
** Industrial soil ingestion standards
(1) PID reading (ppm)

U - Parameter not detected above identified reporting limit
L - Parameter present, reported value may be biased low
UL - Parameter not detected, quantitation limit may be biased low
J - Parameter present, reported value may be inaccurate or imprecise
UJ - Parameter not detected, quantitation limit may be inaccurate or imprecise

TABLE 5
PHASE II ESA
VOLATILE ORGANIC COMPOUND SAMPLE RESULTS (GROUNDWATER)
NORTHFIELD PIN 4770880

PARAMETER	VTDEC* Enforcement Standards		MW1-880	MW2-880	MW3-880	MW5-880	MW6-880	MW7-880	MW8-880	MW9-880	MW10-880	MW11-880	MW12-880	Method Detection Limit	
	Water µg/L	Soil** mg/Kg	Water µg/L	Water µg/L	Water µg/L	Water µg/L	Water µg/L	Water µg/L	Water µg/L	Water µg/L	Water µg/L	Water µg/L	Water µg/L	Water µg/L	Soil mg/kg
Benzene	5.0	200	U	U	U	U	U	3.2	U	1.3	U	U	U	0.3	0.001
Bromoform	2.4 +	720	U	U	U	U	U	U	U	U	U	U	U	0.5	0.004
Bromomethane	8.7 +	2,900	U	U	U	U	U	U	U	U	U	U	U	0.6	0.005
Carbon tetrachloride	5.0	44	U	U	U	U	U	U	U	U	U	U	U	0.3	0.006
Chlorobenzene	100.0	41,000	U	U	U	U	U	U	U	U	U	U	U	0.3	0.003
Chlorodibromomethane	0.13 +	68	U	U	U	U	U	U	U	U	U	U	U	0.6	0.004
Chloroethane	3.6 +	2,000	U	U	U	U	U	U	U	U	U	U	U	1.0	0.005
2-Chloroethylvinylether	150 +	51,000	U	U	U	U	U	U	U	U	U	U	U	1.5	0.004
Chloroform	0.15 +	940	U	U	U	U	U	U	U	U	U	U	U	0.4	0.002
Chloromethane	1.4 +	440	U	U	U	U	U	U	U	U	U	U	U	1.0	0.004
1,2-Dichlorobenzene	620.0	180,000	U	U	U	U	U	U	U	U	U	U	U	0.3	0.002
1,3-Dichlorobenzene	620.0	180,000	U	U	U	U	U	U	U	U	U	U	U	0.4	0.003
1,4-Dichlorobenzene	75.0	240	U	U	U	U	U	U	U	U	U	U	U	0.4	0.004
Dichlorobromomethane	0.17 +	410,000	U	U	U	U	U	U	U	1.5	U	U	U	0.5	0.002
1,1-Dichloroethane	810 +	200,000	U	U	U	U	U	U	U	U	U	U	U	0.6	0.002
1,2-Dichloroethane	5.0	63	U	U	U	U	U	U	U	U	U	U	U	0.7	0.003
1,1-Dichloroethene	7.0	9.5	U	U	U	U	U	U	U	U	U	U	U	0.6	0.002
Ethylene Dibromide	0.0005	.067	U	U	U	U	U	U	U	U	U	U	U	0.4	0.006
cis-1,2-Dichloroethene	70.0	20,000	U	U	U	U	U	U	U	U	U	U	U	0.6	0.003
trans-1,2-Dichloroethene	70.0	41,000	U	U	U	U	U	U	U	U	U	U	U	1.6	0.003
1,2-Dichloropropane	0.56	84	U	U	U	U	U	U	U	U	U	U	U	0.5	0.003
cis-1,3-Dichloropropene (1)	0.2	32	U	U	U	U	U	U	U	U	U	U	U	1.0	0.002
trans-1,3-Dichloropropene (1)	0.2	32	U	U	U	U	U	U	U	U	U	U	U	1.0	0.004
Ethylbenzene	680.0	200,000	U	U	U	U	U	1.4	U	77	U	U	U	0.3	0.002
Methylene Chloride	5.0	760	U	U	U	U	UB	1.3	2.7	U	1.4	UB	1.3	0.7	0.010
Styrene	5.0	410,000	U	U	U	U	U	U	U	U	U	U	U	0.4	0.002
1,1,2,2-Tetrachloroethane	0.7	290	U	U	U	U	U	U	U	U	U	U	U	0.6	0.003
Tetrachloroethene	0.7	110	U	U	U	U	U	U	U	U	U	U	U	0.4	0.002
Toluene	2,420	410,000	U	U	U	U	U	0.7	U	U	U	U	U	0.4	0.002
1,1,1-Trichloroethane	200	41,000	U	U	U	U	U	U	U	U	U	U	U	0.3	0.003
1,1,2-Trichloroethane	0.19 +	100	U	U	U	U	U	U	U	5.8	U	U	U	0.4	0.002
Trichloroethene	5.0	520	U	U	U	U	U	U	U	U	U	U	U	0.3	0.003
Vinyl Chloride	2.0	3	U	U	U	U	U	U	U	U	U	U	U	0.7	0.002
m&p Xylene (1)	400.0	1,000,000	U	2.2	U	U	U	3.2	U	41	U	U	U	0.8	0.002
o-Xylene (1)	400.0	1,000,000	U	U	U	U	U	1.1	U	1.9	U	U	U	0.4	0.002

Notes:
Samples analyzed using EPA Method 8260(VOCs)
*State of Vermont , Agency of Natural Resources, Department of Environmental Conservation 'Ground Water Protection Rule and USEPA Region III Risk Based Concentrations Table (exposure via soil ingestion)
**Industrial soil ingestion limits
+Qualitative screening standards based on USEPA Region III Risk Based Concentration Table (exposure via tap water)

U - Parameter not detected above identified reporting limit
J - Parameter present, reported value may be inaccurate or imprecise
UJ - Parameter not detected, quantitation limit may be inaccurate or imprecise

TABLE 5
PHASE II ESA
VOLATILE ORGANIC COMPOUND SAMPLE RESULTS (SURFICIAL SOILS AND BORINGS)
NORTHFIELD PIN 4776880

PARAMETER	VTDEC* Enforcement Standards		SS1-880	MW1-880 (5-7) 1.1[0]	MW2-880 (10-12) 0.8	MW2-880 DUP	MW3-880 (5-7) 0	MW5-880 (10-12) 0	MW6-880 (20-22) 0.5	MW7-880 (5-7) 94	MW8-880 (10-12) 0.9	MW9-880 (5-7) 82	MW10-880 (5-7) 0.8	MW11-880 (15-17) 0.2	MW12-880 (5-7) 0.1	Method Detection Limit	
	Water	Soil**	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Water	Soil
	µg/L	mg/Kg	mg/Kg	mg/Kg	mg/Kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/L	mg/kg
Benzene	5.0	200	U	U	U	0.009	0.005	U	U	U	U	U	U	U	U	0.3	0.001
Bromoform	2.4 +	720	U	U	U	U	U	U	U	U	U	U	U	U	U	0.5	0.004
Bromomethane	8.7 +	2,500	U	U	U	U	U	U	U	U	U	U	U	U	U	0.6	0.005
Carbon tetrachloride	5.0	44	U	U	U	U	U	U	U	U	U	U	U	U	U	0.3	0.006
Chlorobenzene	100.0	41,000	U	U	U	U	U	U	U	U	U	U	U	U	U	0.3	0.003
Chlorodibromomethane	0.13 +	68	U	U	U	U	U	U	U	U	U	U	U	U	U	0.6	0.004
Chloroethane	3.6 +	2,000	U	U	U	U	U	U	U	U	U	U	U	U	U	1.0	0.005
2-Chloroethylvinylether	150 +	51,000	U	U	U	U	U	U	U	U	U	U	U	U	U	1.5	0.004
Chloroform	0.15 +	940	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4	0.002
Chloromethane	1.4 +	440	U	U	U	U	U	U	U	U	U	U	U	U	U	1.0	0.004
1,2-Dichlorobenzene	620.0	180,000	U	U	U	U	U	U	U	U	U	U	U	U	U	0.3	0.002
1,3-Dichlorobenzene	620.0	180,000	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4	0.003
1,4-Dichlorobenzene	75.0	240	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4	0.004
Dichlorobromomethane	0.17 +	410,000	U	U	U	U	U	U	U	U	U	U	U	U	U	0.5	0.002
1,1-Dichloroethane	810 +	200,000	U	U	U	U	U	U	U	U	U	U	U	U	U	0.6	0.002
1,2-Dichloroethane	5.0	63	U	U	U	U	U	U	U	U	U	U	U	U	U	0.7	0.003
1,1-Dichloroethene	7.0	9.5	U	U	U	U	U	U	U	U	U	U	U	U	U	0.6	0.002
Ethylene Dibromide	0.0005	.067	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4	0.006
cis-1,2-Dichloroethene	70.0	20,000	U	U	U	U	U	U	U	U	U	U	U	U	U	0.6	0.003
trans-1,2-Dichloroethene	70.0	41,000	U	U	U	U	U	U	U	U	U	U	U	U	U	1.6	0.003
1,2-Dichloropropane	0.56	84	U	U	U	U	U	U	U	U	U	U	U	U	U	0.5	0.003
cis-1,3-Dichloropropene (1)	0.2	32	U	U	U	U	U	U	U	U	U	U	U	U	U	1.0	0.002
trans-1,3-Dichloropropene (1)	0.2	32	U	U	U	U	U	U	U	U	U	U	U	U	U	1.0	0.004
Ethylbenzene	680.0	200,000	U	U	U	U	U	U	U	U	U	U	U	U	U	0.3	0.002
Methylene Chloride	5.0	760	U	<0.016J	<0.22J	<0.015J	<0.017J	<0.013J	U	U	<0.022J	U	U	U	<0.015J	0.7	0.010
Styrene	5.0	410,000	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4	0.002
1,1,2,2-Tetrachloroethane	0.7	290	U	U	U	U	U	U	U	U	U	U	U	U	U	0.6	0.003
Tetrachloroethene	0.7	110	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4	0.002
Toluene	2,420	410,000	U	U	U	U	U	U	U	U	U	0.005	U	U	U	0.4	0.002
1,1,1-Trichloroethane	200	41,000	U	U	U	U	U	U	U	U	U	U	U	U	U	0.3	0.003
1,1,2-Trichloroethane	0.19 +	100	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4	0.002
Trichloroethene	5.0	520	U	U	U	U	U	U	U	U	U	U	U	U	U	0.3	0.003
Vinyl Chloride	2.0	3	U	U	U	U	U	U	U	U	U	U	U	U	U	0.7	0.002
m&p Xylene (1)	400.0	1,000,000	U	U	0.004	0.007	U	U	U	U	U	0.023	U	U	U	0.8	0.002
o-Xylene (1)	400.0	1,000,000	U	U	U	U	U	U	U	U	U	U	U	U	U	0.4	0.002

Notes:
Samples analyzed using EPA Method 8260(VOCs)
*State of Vermont, Agency of Natural Resources, Department of Environmental Conservation "Ground Water Protection Rule and USEPA Region III Risk Based Concentrations Table (exposure via soil ingestion)
**Industrial soil ingestion limits
+Qualitative screening standards based on USEPA Region III Risk Based Concentration Table (exposure via tap water)
(1) PID reading (ppm)

U - Parameter not detected above identified reporting limit
J - Parameter present, reported value may be inaccurate or imprecise
UJ - Parameter not detected, quantitation limit may be inaccurate or imprecise

Results). The subsurface investigation of the subject property included drilling 11 soil borings, and installation of 11 permanent groundwater-monitoring wells. A total of 12 subsurface soil samples (including one duplicate sample), 11 groundwater samples, and one (1) surface soil sample were collected and analyzed for PNAs and VOCs content. No free product was encountered during the investigation of the subject property, thus free phase sampling and chromatograms were not required.

PIN 4770880 was evaluated as a whole based on its history of use by the railroad, bulk fuel (oil and coal) distributors, lumberyards, and wood preservation and finishing operations. Potential on-site impacts were evaluated by locating the 11 borings and monitoring wells in the vicinity of APECs, which may have had the potential to impact soil and groundwater conditions on the subject property. The locations of the borings and the APECs that they apply to are summarized in Table 2. Soil boring samples were generally collected at 5-foot intervals to the total depth of each boring and field screened for VOCs using a PID. Low PID readings, ranging from 0.0 to 3.6 ppm were encountered in most of the borings. However, maximum PID readings of 94 ppm and 82 ppm were recorded during the drilling of borings 880-MW7 and 880-MW9. No other gross indicators of contamination (staining of soils, odors) were noted as the borings were advanced. Groundwater was encountered at approximately one (1) to six (6) feet bg.

In general, soil samples from each boring were selected for laboratory analysis based upon the highest recorded PID readings or were selected from the bottom of each boring. One soil sample from each boring was selected and submitted to Philip Analytical for analysis of PAHs and VOCs.

Boring/well 880-MW1 was located in the southwest corner of the subject property to investigate the potential impacts of the former lumber operations that took place on that portion of the site. The boring was advanced to a total depth of 13.5 feet bg where it encountered refusal due to contact with bedrock. A maximum PID reading of 1.2 ppm was encountered during drilling operations. One soil sample from the 5 to 7 foot intervals was selected for laboratory analysis. Groundwater was encountered during drilling operations at a depth of 6 feet bg and monitoring

well 880-MW1 was constructed with a screen placed from approximately 3.5 feet bg to 13.5 feet bg. The results of PNA and VOC analysis of the soil and groundwater samples indicate the presence of several PNAs in the soil sample, but none of the concentrations exceeded VTDEC Enforcement Standards (no standards exist for acenaphthene, phenanthrene, or benzo(ghi)perylene). No PNAs were present in the groundwater sample. No VOCs were detected in the soil sample or the groundwater sample.

Two borings/wells (880-MW2 and 880-MW5) were drilled and installed to investigate the potential impacts due the former UST associated with the Northfield Wood Products facility. Boring 880-MW2 was advanced to a total depth of 13.5 feet bg where refusal was encountered. Subsurface soils were sampled continuously to a depth of 12 feet bg. A maximum PID reading of 0.8 ppm was recorded during drilling operations. No other indicators of contamination were noted. One soil sample and one duplicate sample from the 10 to 12 foot intervals were selected for laboratory analyses. Analytical results indicated the samples contained no detectable PNAs and no VOCs above the applicable VTDEC Enforcement Standards. Groundwater was encountered at 9 feet bg and monitoring well 880-MW2 was installed with a screened interval from 3.5 to 13.5 feet bg. A groundwater sample collected from the well contained no detectable PNAs or VOCs.

Boring/well 880-MW5 was advanced to a total depth of 13 feet bg. No organic vapors were detected with the PID as the boring was advanced and no other indicators of potential contamination were encountered. One soil sample from the 10 to 12 foot intervals was selected for laboratory analysis. Analytical results indicate the sample contained no detectable concentrations of PNAs or VOCs. Groundwater was encountered at 7 feet bg and monitoring well 880-MW5 was installed with a screened interval from 3 to 13 feet bg. A groundwater sample collected from the well contained no detectable PNAs or VOCs.

The potential impacts due to the storage and distribution of lacquer products in the Northfield Wood Products lacquer storage building were investigated by drilling and installing monitoring well 880-MW3. The boring was advanced to a total depth of 9 feet bg. A maximum PID reading of 0.1 ppm was recorded as drilling continued, but no other indicators of contamination

were noted. One soil sample from the 5 to 7 foot intervals was selected for laboratory analysis. Analytical results indicated the sample contained no detectable PNAs and no VOCs above applicable VTDEC Enforcement Standards. Groundwater was encountered at approximately 6 feet bg and monitoring well 880-MW3 was installed with a screened interval from 4 to 9 feet bg. A groundwater sample collected from the well contained no detectable PNAs or VOCs.

Boring/well 880-MW6 was located near the eastern border of the property and downgradient of a stockpile of oil-stained soil. The stockpile was generated during the excavation and decommissioning of a 1000-gallon diesel fuel UST located near the southeast corner of the Northfield Fuels offices. Boring 880-MW6 was advanced to a total depth of 22 feet bg. A maximum PID reading of 0.5 ppm was recorded off of material collected near the bottom of the boring. No other indicators of potential contamination were encountered. One soil sample from the 20 to 22 foot intervals was selected for laboratory analysis. Analytical results indicated the sample contained no detectable PNAs or VOCs. Groundwater was encountered in the boring at approximately 13 feet bg and monitoring well 880-MW6 was installed with a screened interval from 10 to 20 feet bg. A groundwater sample collected from the well contained no detectable PNAs or VOCs.

The potential impacts due to the aboveground storage tanks (ASTs) and the former pump house associated with historic and current bulk fuel storage were investigated through the drilling and installation of five borings/wells. Boring 880-MW7 was located northeast of the unused Northfield Fuels pump house and west of the bermed Northeast Fuels ASTs. The boring was advanced to a total depth of 16 feet bg. A maximum PID reading of 94 ppm was associated with soil collected from the 5 to 7 foot intervals. Material from this interval was submitted to the laboratory for further analysis. The analytical results indicate the presence of several PNAs, but at concentrations well below applicable VTDEC Enforcement Standards. No VOCs were detected. Groundwater was encountered in the boring at 4 feet bg and monitoring well 880-MW7 was installed with a screened interval extending from 3 to 13 feet bg. A groundwater sample collected from the well contained no detectable PNAs and no VOCs at concentrations that exceeded applicable VTDEC Enforcement Standards.

Boring/well 880-MW8 was located north of the bermed Northfield Fuels ASTs, northwest of two small diesel ASTs, and south of the bermed Gillespie Fuels ASTs. The boring was advanced to a total depth of 13 feet bg before encountering refusal. A maximum PID reading of 0.9 ppm was recorded as drilling progressed. A soil sample from the 10 to 12 foot intervals was selected and submitted to the laboratory for further analysis. The analytical results indicate the presence of several PNAs, but at concentrations well below applicable VTDEC Enforcement Standards. No VOCs were detected in the soil sample. Groundwater was encountered in the boring at 4 feet bg and monitoring well 880-MW8 was installed in the boring with a screened interval extending from 3 to 13 feet bg. A groundwater sample collected from the well contained no detectable VOCs. Several PNAs were present in the groundwater sample. Of these, only the concentration of benzo(a)anthracene (0.5 µg/L) was present at a concentration that exceeded the applicable VTDEC Enforcement Standards of (0.092 mg/L).

Boring/well 880-MW9 was located northwest of the bermed Gillespie Fuels ASTs and south of the Gillespie Fuels offices. The boring was sampled to a total depth of 7 feet bg, but auger refusal was encountered at only 5.5 feet bg. A maximum PID reading of 82 ppm was recorded within the 5 to 7 foot intervals as drilling progressed. A soil sample from this interval was selected and submitted to the laboratory for further analysis. The analytical results indicate the presence of several PNAs, but at concentrations well below applicable VTDEC Enforcement Standards. No VOCs were detected at concentrations that exceeded applicable VTDEC Enforcement Standards. Groundwater was encountered in the boring at 5 feet bg and monitoring well 880-MW9 was installed in the boring with a screened interval extending from 2.5 to 5.5 feet bg. A groundwater sample collected from the well contained several PNAs, but none were present at concentrations that exceeded VTDEC Enforcement Standards. The groundwater sample also contained detectable concentrations of 6 VOCs. Of these, the concentrations of dichlorobromomethane (3.5 µg/L) and 1,1,2-trichloroethane (5.8 µg/L) exceeded the VTDEC Enforcement Standards of 0.17 µg/L and 0.19 µg/L, respectively.

Borings/wells 880-MW10 and 880-MW12 were located west of the Gillespie Fuels offices and downgradient from a small fuel oil AST and waste oil AST. Boring 880-MW10 was sampled to

a total depth of 7 feet bg with auger refusal at 6 feet bg. A maximum PID reading of 0.8 ppm was recorded within the 5 to 7 foot intervals as drilling progressed and a soil sample from this interval was selected and submitted to the laboratory for further analysis. The analytical results indicate no detectable concentrations of PNAs or VOCs in the soil sample. Groundwater was encountered in the boring at 5 feet bg and monitoring well 880-MW10 was installed in the boring with a screened interval extending from 2 to 6 feet bg. A groundwater sample collected from the well contained no detectable concentrations of PNAs and no VOCs at concentrations, which exceeded applicable VTDEC Enforcement Standards.

Boring 880-MW12 was also sampled to a total depth of 7 feet bg with auger refusal at 6 feet bg. A maximum PID reading of 0.1 ppm was recorded as drilling progressed, but no other indications of contamination were noted. A soil sample from the 5 to 7 foot intervals was selected and submitted to the laboratory for further analysis. The analytical results indicate no detectable concentrations of PNAs or VOCs in the soil sample. Groundwater was encountered in the boring at 5 feet bg and monitoring well 880-MW12 was installed in the boring with a screened interval extending from 3 to 6 feet bg. A groundwater sample collected from the well contained no detectable concentrations of PNAs and no VOCs at concentrations, which exceeded applicable VTDEC Enforcement Standards.

Boring/well 880-MW11 was located in the northeast corner of the subject property to evaluate upgradient soil and groundwater conditions. The boring was advanced to a total depth of 27 feet with auger refusal at 25 feet. A maximum PID reading of 0.5 ppm was recorded as drilling progressed, but no other indications of contamination were noted. A soil sample from the 15 to 17 foot intervals was selected for laboratory analysis. The analytical results indicate no detectable concentrations of PNAs or VOCs were present in the soil sample. Groundwater was encountered in the boring at 16 feet bg and monitoring well 880-MW11 was installed with a screened interval extending from 15 to 25 feet bg. A groundwater sample collected from the well contained no detectable concentrations of PNAs or VOCs.

One surface soil sample was collected from an area of noticeably stained surface soils near the fueling rack next to the unused Northfield Fuels pump house (see Figure 2). The surface soil

sample was collected at one location and was representative of soils from 0 to 6 inches bg. The sample (880-SS1) was submitted for analysis of PNAs and VOCs. The analytical results indicate that no VOCs are present at concentrations, which exceed the method detection limit. Several PNAs were present in the sample, but only benzo(a)pyrene (0.79 mg/Kg) was present at a concentration, which exceeded the VTDEC Enforcement Standard of 0.78 mg/Kg.

5.3 Laboratory QA/QC

The validity of the field sample and QA/QC data reported by Philip was summarized by Golder using the data qualifiers described in the USEPA Functional Guidelines for Data Validation (1988). Data with method spike and duplicate recoveries differing by greater than 30% were qualified with a J, indicating the reported value may be inaccurate or imprecise. Samples with analyte concentrations below reporting limits were qualified with a U, indicating that the analyte was tested for but not detected. Analyte concentrations that were not present greater than five times their concentration detected in the method, rinsate, or trip blanks were qualified with a B, indicating the analyte was not detected substantially above the level reported in the blanks. Method detection limits were met for all sample VOC and PNA analyses.

Due to the presence of methylene chloride in method blank results, the methylene chloride detection limits for several of the soil samples were slightly elevated. The elevated MDLs, noted in Table 5, do not exceed VTDEC Enforcement Standards and therefore are of little concern.

6.0 DISCUSSION

The following sections present the findings of this Phase II ESA including the description and location of contaminated soil and/or groundwater, potential migration pathways and potential receptors.

6.1 Soil and Groundwater Quality

Benzo(a)anthracene was detected at a concentration slightly exceeding VTDEC enforcement standards in surface (0-0.5 feet bgs) sample 880-SS1 collected from a small area of stained soils near a presently unused pump house. Groundwater samples collected from monitoring well 880-MW8 exceeded the standard for benzo(a)anthracene and samples from 880-MW9 exceeded standards for dichlorobromomethane and 1,1,2-trichloroethane.

6.2 Migration Patterns

Surficial soils in the vicinity of 880-SS1 could migrate as blown dust or by adhering to humans or animals that may come into contact with them. The industrial/commercial use of the subject property limits access and the likelihood of significant exposure is very small.

Groundwater exceeding VTDEC standards was limited to monitoring wells 880-MW8 and 880-MW9. Although the potential exists for offsite transport to the Dog River, no detectable impacts are likely because the groundwater velocity hence flow rate is extremely low.

6.3 Physical Receptors

It is unlikely that individuals or animals will come into frequent contact with soils in the vicinity of 880-SS1 because access to them is limited to workers on the site. On-site groundwater is not used and the Dog River is the only physical receptor. No detectable impact to the Dog River is expected because of the extremely low groundwater velocity and low concentrations of contaminants detected above the standard.

7.0 LIMITING CONDITIONS

Laboratory method detection limits (MDLs) exceeded the groundwater VTDEC Enforcement Standards for the following VOCs and PNAs: chloroform; dichlorobromomethane; chlorodibromomethane; ethylene dibromide; cis-1,3-dichloropropene; trans-1,3-dichloropropene; 1,1,2-trichloroethane; benzo(a)anthracene; benzo(b)fluoranthene; benzo(a)pyrene; indeno(1,2,3-cd)pyrene; and dibenzo(ah)anthracene. Groundwater is not used on the subject property or nearby properties, so concern over the possible presence of these compounds in areas not known to have been impacted is somewhat minimal.

8.0 REFERENCES

A list of references used for this ESA is provided in Table 6.

TABLE 6
REFERENCES
PIN 4770880

SOURCE	AGENCY OR COMPANY	COMMENTS
Surficial Geology of Vermont	Vermont Geological Survey, 1970	Surficial soils description
Centennial Geologic Map of Vermont	Vermont Geological Survey, 1961	Bedrock description
Geology for Environmental Planning in the Barre-Montpelier Region, Vermont	Vermont Geological Survey, 1961	Local geology description
CN Real Estate Management, CV Properties, Inc., PIN 4770880, South of Wall Street, Northfield, Vermont, Phase I Environmental Site Assessment	Heindel and Noyes, May 14, 1997	Summary of existing information

9.0 SIGNATURES OF ENVIRONMENTAL PROFESSIONALS

Golder completed this Phase II ESA in conformance with the Terms of Reference that accompanied the request for proposal (RFP) to investigate this property and the Master Services agreement between CN and Golder, dated March 25, 1997.

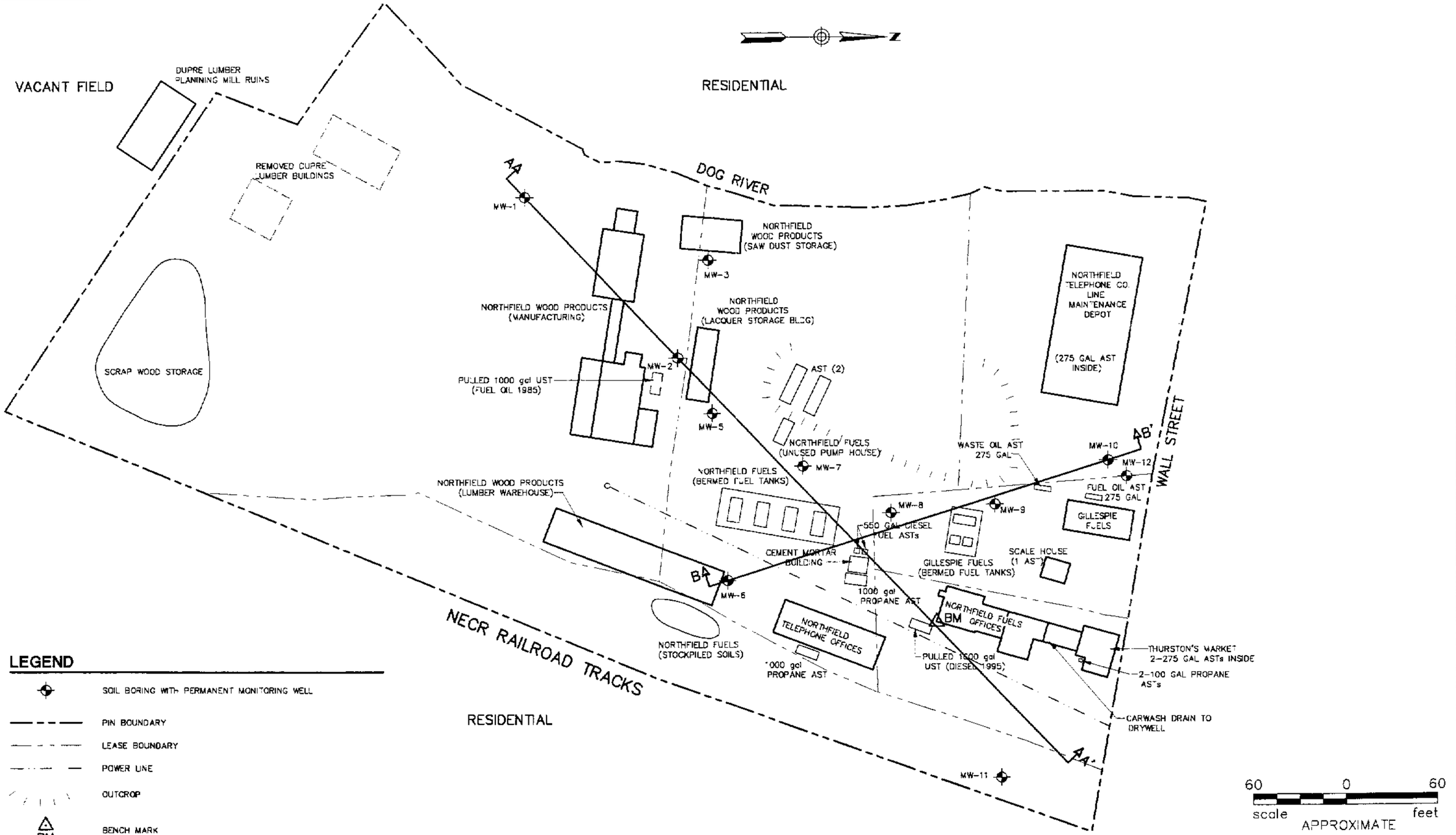
Very truly yours,

GOLDER ASSOCIATES INC.

James K. Barrett

James K. Barrett, P.E., LSP
Senior Project Manager

JKB/ljl



LEGEND

- SOIL BORING WITH PERMANENT MONITORING WELL
- PIN BOUNDARY
- LEASE BOUNDARY
- POWER LINE
- OUTCROP
- BM — BENCH MARK
- BA — CROSS SECTION LOCATION

JOB No: 973-6825	SCALE: AS SHOWN	SOUTH OF WALL ST. NORTHFIELD, VT. SITE PLAN PIN No. 4770880	
DR BY: CDS	DATE: 06/22/98		
CHK BY:	FILE No.: 4770880		
REV BY:	DR SUBTITLE: 02		
Golder Associates		CANADIAN NATIONAL R.R	FIGURE: 2

VACANT FIELD

DUPRE LUMBER PLANINING MILL RUINS

REMOVED DUPRE LUMBER BUILDINGS

SCRAP WOOD STORAGE

RESIDENTIAL

DOG RIVER

MW-1

NORTHFIELD WOOD PRODUCTS (SAW DUST STORAGE)

MW-3

NORTHFIELD WOOD PRODUCTS (LACQUER STORAGE BLDG)

NORTHFIELD WOOD PRODUCTS (MANUFACTURING)

97

98

99

MW-2

PULLED 1000 gal UST (FUEL OIL 1985)

AST (2)

MW-5

NORTHFIELD FUELS (UNUSED PUMP HOUSE)

MW-7

NORTHFIELD FUELS (BERMED FUEL TANKS)

NORTHFIELD WOOD PRODUCTS (LUMBER WAREHOUSE)

MW-8

MW-9

550 GAL DIESEL FUEL ASTs

CEMENT MORTAR BUILDING

GILLESPIE FUELS (BERMED FUEL TANKS)

SCALE HOUSE (1 AST)

1000 gal PROPANE AST

NORTHFIELD TELEPHONE OFFICES

NORTHFIELD FUELS OFFICES

BM

PULLED 1000 gal UST (DIESEL 1995)

1000 gal PROPANE AST

NORTHFIELD FUELS (STOCKPILED SOILS)

NECR RAILROAD TRACKS

RESIDENTIAL

NORTHFIELD TELEPHONE CO. LINE MAINTENANCE DEPOT

(275 GAL AST INSIDE)

WASTE OIL AST 275 GAL

MW-10

MW-12

FUEL OIL AST 275 GAL

GILLESPIE FUELS

THURSTON'S MARKET 2-275 GAL ASTs INSIDE

2-100 GAL PROPANE ASTs

CARWASH DRAIN TO DRYWELL

MW-11

WALL STREET

97

98

99

LEGEND

- SOIL BORING WITH PERMANENT MONITORING WELL
- PIN BOUNDARY
- LEASE BOUNDARY
- POWER LINE
- OUTCROP
- BM — BENCH MARK (100.0 feet, arbitrary datum)
- 81.36 — POTENTIOMETRIC CONTOUR
- GROUNDWATER FLOW

60 0 60

scale APPROXIMATE feet

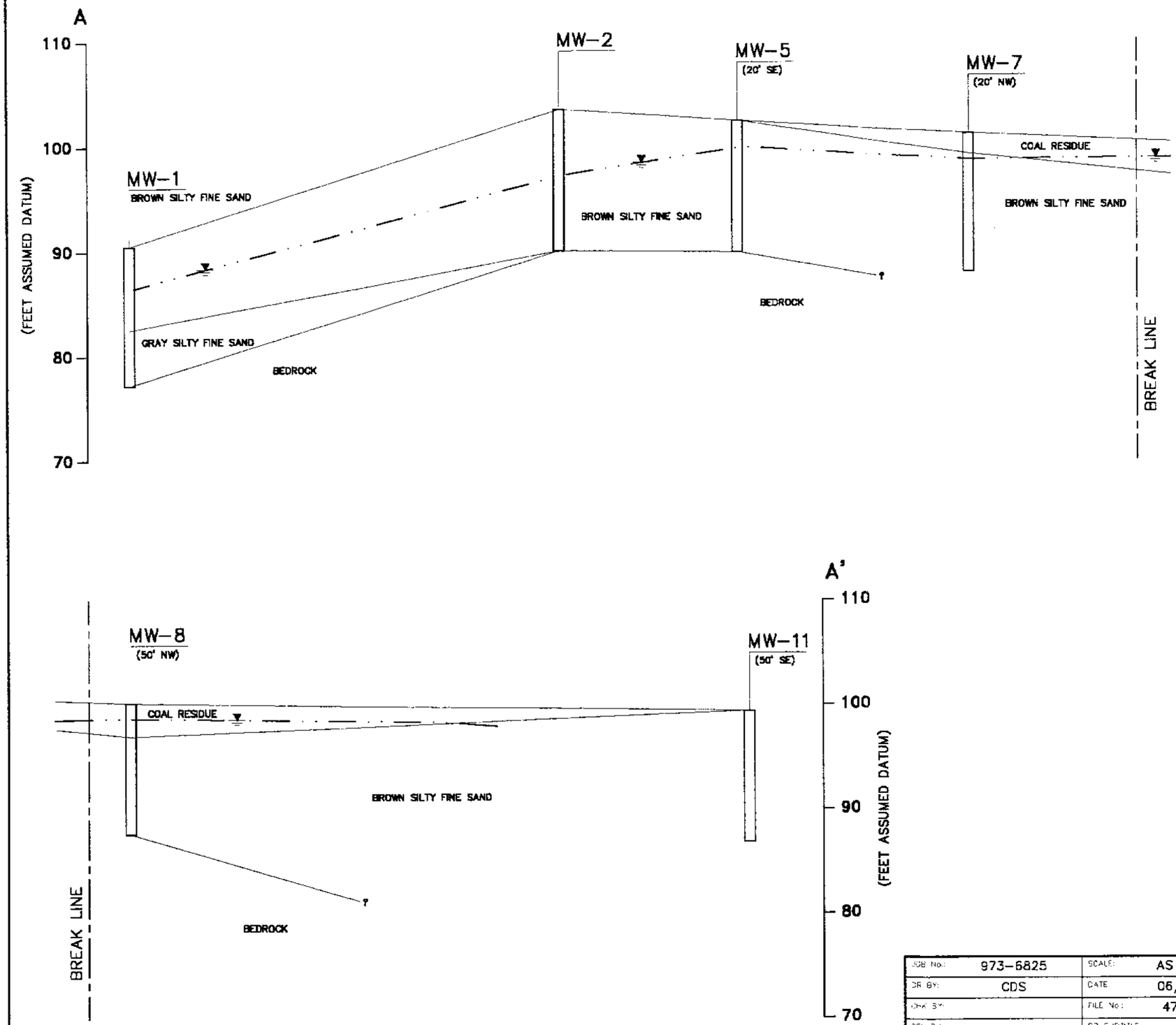
JOB No.:	973-6825	SCALE:	AS SHOWN
DR BY:	CDS	DATE:	06/22/98
CHK BY:		FILE No.:	4770880
REV BY:		OR SUBTITLE:	02

Golder Associates

SOUTH OF WALL ST. NORTHFIELD, VT.
GROUNDWATER CONTOUR MAP
PIN No. 4770880

CANADIAN NATIONAL R.R

FIGURE 3



JOB No:	973-6825	SCALE:	AS SHOWN
DR BY:	CDS	DATE	06/22/98
CHK BY:		FILE No:	4770880
REV BY:		DR SUBTITLE.	02

Golder Associates

SOUTH OF WALL ST. NORTHFIELD, VT.
CROSS SECTION A-A'
PIN No. 4770880

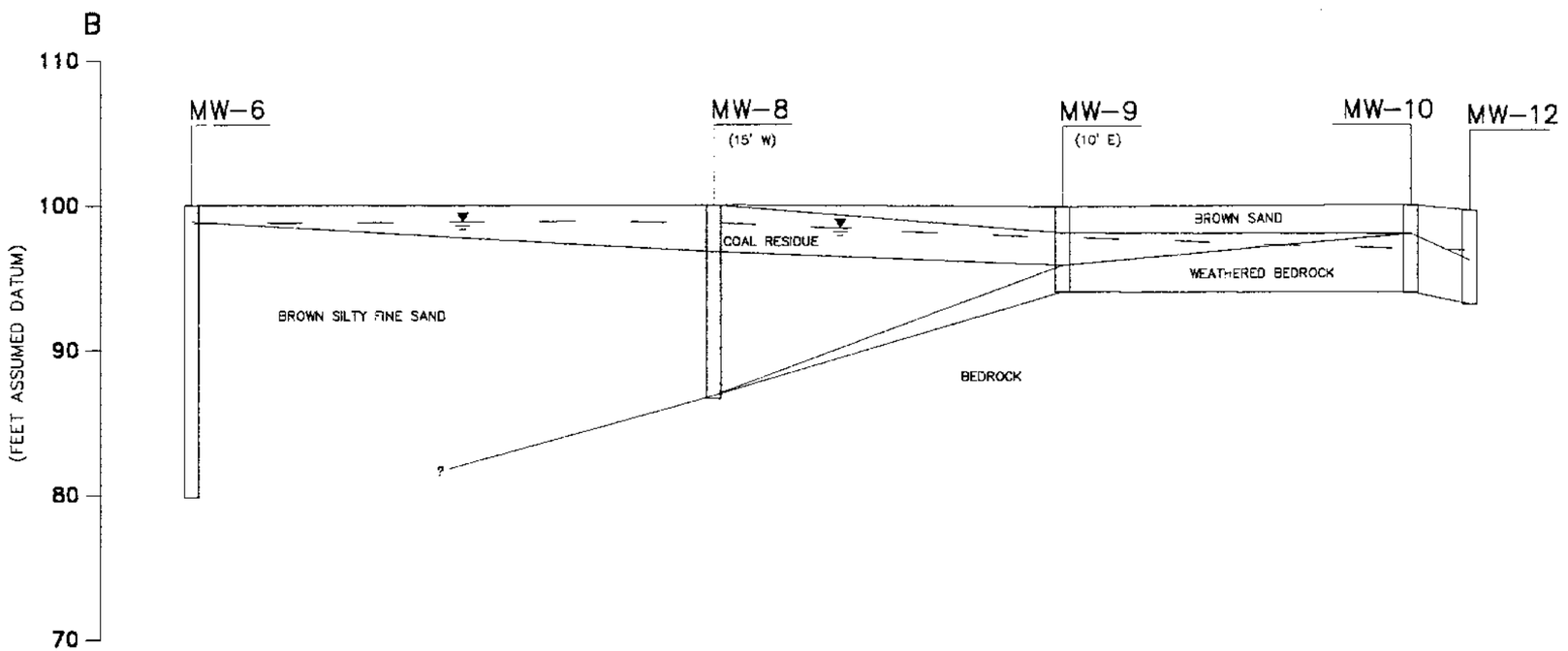
CANADIAN NATIONAL R.R

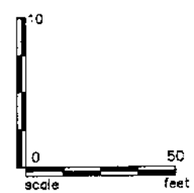
FIGURE 4

LEGEND

MW-2

SOIL BORING WITH PERMANENT MONITORING WELL





JOB No. 973-6825	SCALE: AS SHOWN	SOUTH OF WALL ST. NORTHFIELD, VT. CROSS SECTION B-B' PIN No. 4770880	
DR BY: CDS	DATE: 06/22/98		
CHK BY:	FILE No.: 4770880		
REV BY:	DR SUBTITLE: 02		
Golder Associates		CANADIAN NATIONAL R.R	FIGURE 5

APPENDIX A
SITE PHOTOGRAPHS

VACANT FIELD

DUPRE LUMBER PLANINING MILL RUINS

REMOVED DUPRE LUMBER BUILDINGS

SCRAP WOOD STORAGE

RESIDENTIAL

DOG RIVER

NORTHFIELD WOOD PRODUCTS (SAW DUST STORAGE)

NORTHFIELD WOOD PRODUCTS (MANUFACTURING)

PULLED 1000 gal UST (FUEL OIL 1985)

NORTHFIELD TELEPHONE CO. LINE MAINTENANCE DEPOT

(275 GAL AST INSIDE)

AST (2)

NORTHFIELD FUELS (UNUSED PUMP HOUSE)

WASTE OIL AST 275 GAL

WALL STREET

NORTHFIELD FUELS (BERMED FUEL TANKS)

NORTHFIELD WOOD PRODUCTS (LUMBER WAREHOUSE)

550 GAL DIESEL FUEL ASTs

GILLESPIE FUELS

CEMENT MORTAR BUILDING

GILLESPIE FUELS (BERMED FUEL TANKS)

SCALE HOUSE (1 AST)

1000 gal PROPANE AST

NORTHFIELD FUELS BM OFFICES

NORTHFIELD TELEPHONE OFFICES

NORTHFIELD FUELS (STOCKPILED SOILS)

1000 gal PROPANE AST

PULLED 1500 gal UST (DIESEL 1995)

THURSTON'S MARKET 2-275 GAL ASTs INSIDE

2-100 GAL PROPANE ASTs

CARWASH DRAIN TO DRYWELL

NECR RAILROAD TRACKS

RESIDENTIAL

MW-1 MW-2 MW-3 MW-5 MW-6 MW-7 MW-8 MW-9 MW-10 MW-11 MW-12

AA' BB' A A'

1 2 3 4 5 6 7 8 9 10 11 12 13 14

LEGEND

- SOIL BORING WITH PERMANENT MONITORING WELL
- PIN BOUNDARY
- LEASE BOUNDARY
- POWER LINE
- OUTCROP
- BM — BENCH MARK
- CROSS SECTION LOCATION
- SITE PHOTOGRAPHS

60 0 60

scale feet

APPROXIMATE

JOB No.:	973-6825	SCALE:	AS SHOWN
DR BY:	CDS	DATE:	06/22/98
CHK BY:		FILE No.:	4770880
REV BY:		OR SUBTITLE:	02

Golder Associates

SOUTH OF WALL ST. NORTHFIELD, VT.

SITE PHOTOS

PIN No. 4770880

CANADIAN NATIONAL R.R

FIGURE PHOTO

Site Description: Mile Post 67.75, Roxbury Subdivision, Northfield, Vermont

Date: April 9, 1998 Photographer: Dave Cedarholm

Photo 1

Direction: Southwest

Description:

Location of 880 MW1 (by notebook):

Photo 2

Direction: Southwest

Description:

Location of well: 880 MW2

Site Description: Mile Post 67.75, Roxbury Subdivision, Northfield, Vermont

Date: April 9, 1998

Photographer: Dave Cedarholm

Photo 3

Direction:
Southwest

Description:

Location of 880 MW3

Photo 4

Direction:
West

Description:

Location of proposed 880 MW4. Boring encountered bedrock at 3 feet below ground surface. Hill slope on right side of photo has [illegible]

Site Description: Mile Post 67.75, Roxbury Subdivision, Northfield, Vermont

Date: April 9, 1998 Photographer: Dave Cedarholm

Photo 5

Direction
Northeast

Description

View of well
880 MW5

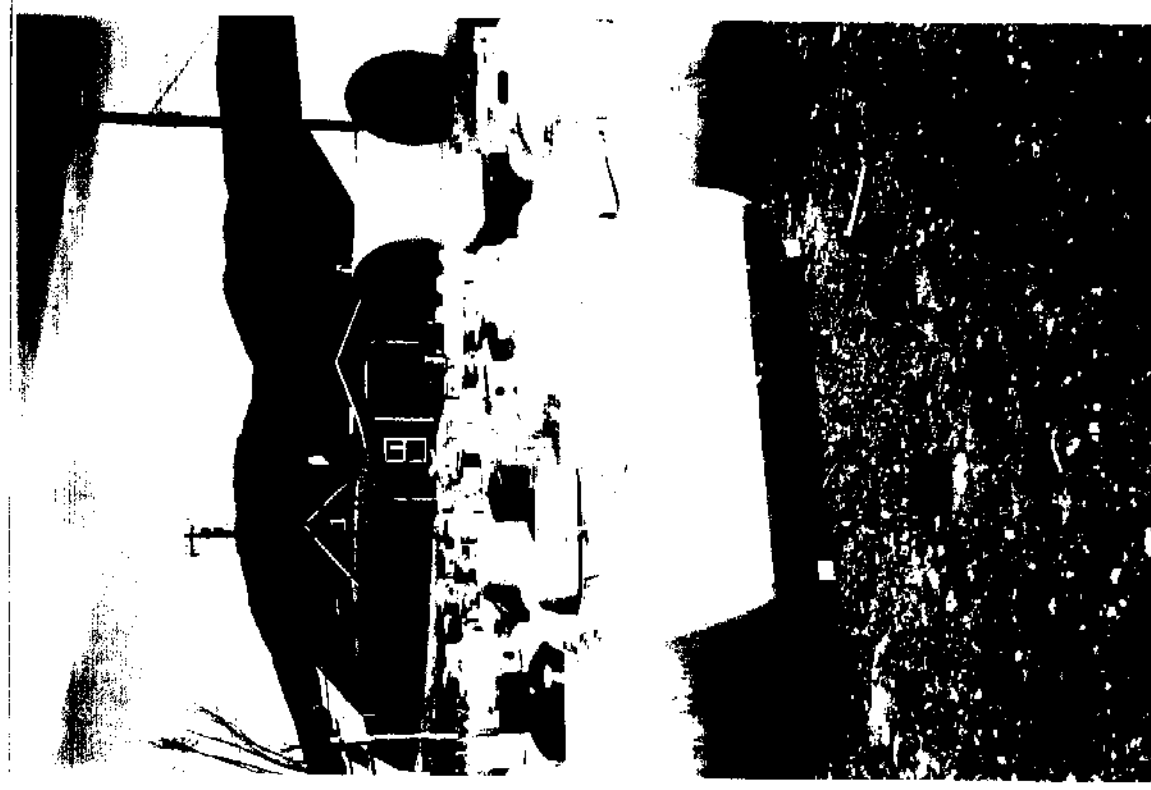
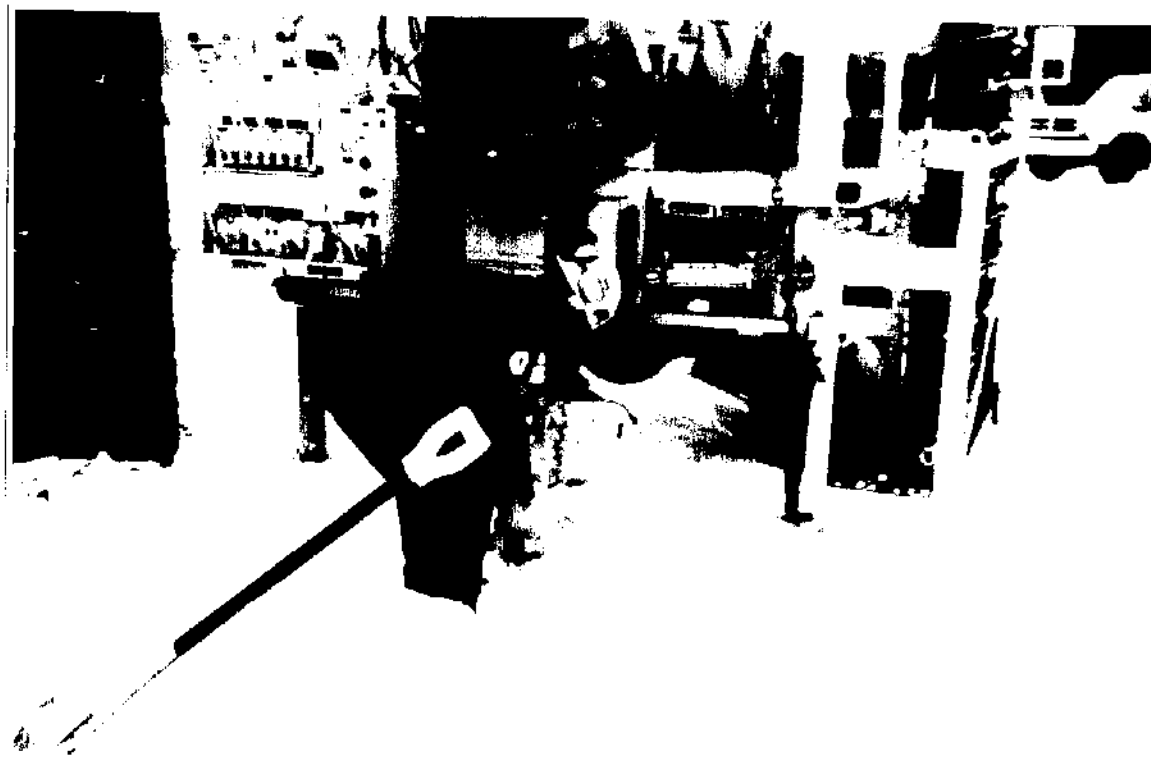


Photo 6

Direction
Southwest

Description

Setting up on
boring for 880
MW6 (12-17-97)



Site Description: Mile Post 67.75, Roxbury Subdivision, Northfield, Vermont

Date: April 9, 1998 Photographer: Dave Cedarholm

Photo 7

Direction
Southeast

Description

View of facility covering 880 MW-6

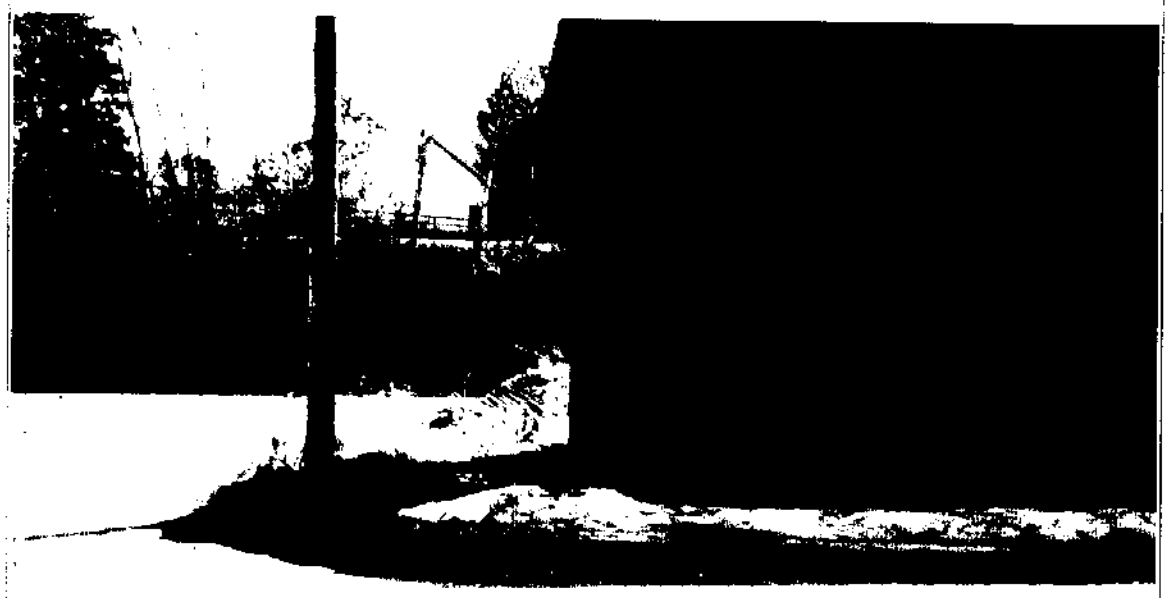


Photo 8

Direction
Southeast

Description

View of Drilling at 880 MW-7

Site Description: Mile Post 67.75, Roxbury Subdivision, Northfield, Vermont

Date: April 9, 1998

Photographer: Dave Cedarholm

Photo 9

Direction: Southwest

Description:

View of 880 MW8 (by notebook). Hill slope on right side of photo is underlain by shallow bedrock

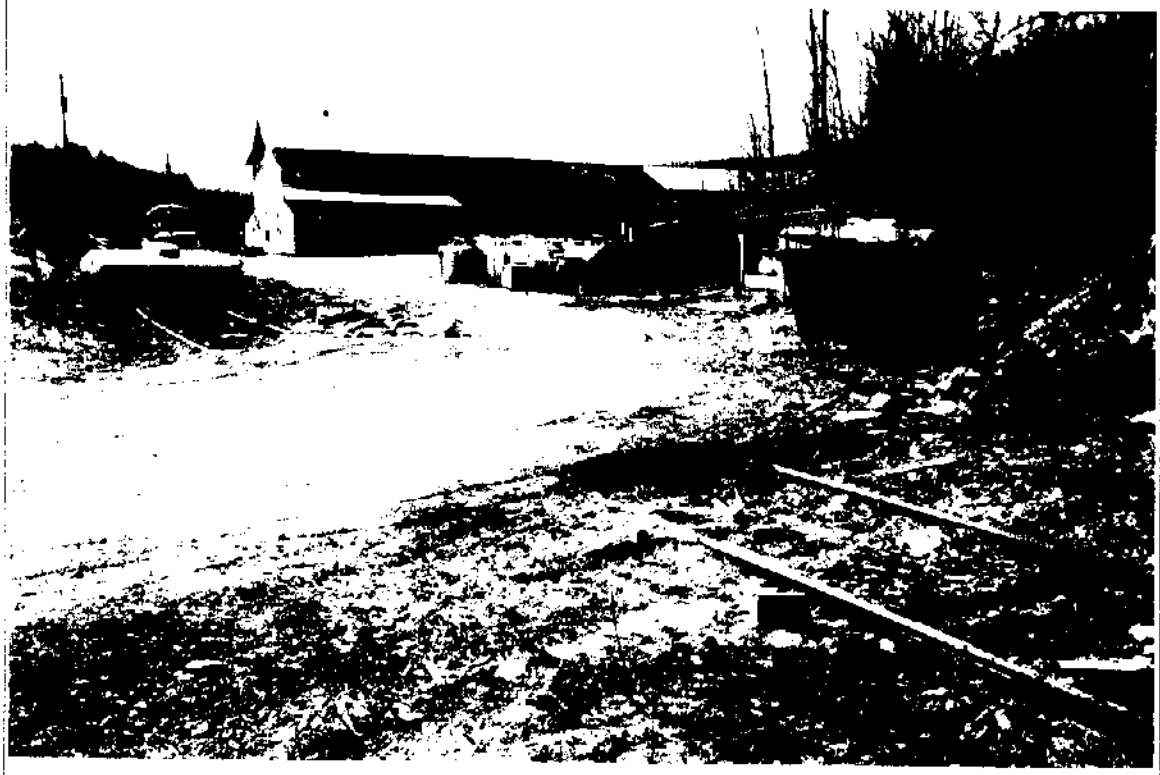


Photo 10

Direction: Southeast

Description:

View of 880 MW

Site Description: Mile Post 67.75, Roxbury Subdivision, Northfield, Vermont

Date: April 9, 1998 Photographer: Dave Cedarholm

Photo 11

Direction: Southwest

Description:

View of 880 MW10. Note bedrock outcrop in background (refusal encountered at 6.0' bgs.

Photo 12

Direction: Southeast

Description:

West 880-MW10, note hillside underlain by shallow bedrock to right.

Site Description: Mile Post 67.75, Roxbury Subdivision, Northfield, Vermont

Date: April 9, 1998 Photographer: Dave Cedarholm

Photo 13

Direction: Northwest

Description: View of rig setting up on 880 MW-11

Photo 14

Direction: Northeast

Description: View of 880 MW-12

APPENDIX B
SOIL BORING LOGS

PROJECT: 973-6825.002

RECORD OF BOREHOLE 4770880-MW1

SHEET 1 OF 1

LOCATION: Northfield, VT PIN 4770880

BORING DATE: 12/12/97

DATUM: local

DRILLER: Capital Environmental Drilling

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	BLOWS/FT	RECOV. (IN.)	PID Readings for Soils (ppm)	ADDITIONAL LAB. TESTING	MONITORING INSTALLATIONS: 880-MW1
0	Rig: CME 550X Method: 4 1/4" Hollow Stem Auger	ground surface		0.0						Flush Box
1					1			○		Concrete
2										2" PVC Casing (0-3.5'bg)
3		Dark brown silty fine SAND								Bentonite Seal
4										
5										
6				6.0	2	4	10	○		Groundwater @ 6'bg
7		ROCK								SOIL SAMPLE 5-7' PNA,VOC
8				8.0						#2 Morey Sand
9										2" Slotted PVC Screen (2'x10') (3.5-13.5'bg)
10										
11		Dark grey silty fine SAND			3	0	22	⊖		
12										
13		BEDROCK								
14		EOH @ 13.5 ft.		13.5						
15										
16										

DATA INPUT: RRB

DEPTH SCALE
1 inch to 2 feet

Golder Associates

LOGGED: S. Chapman
CHECKED:

PROJECT: 973-6825.002

LOCATION: Northfield, VT PIN 4770880

RECORD OF BOREHOLE 4770880-MW2

SHEET 1 OF 1

BORING DATE: 12/16/97

DATUM: local

DRILLER: Capital Environmental Drilling

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	BLOWS/FT	RECOV. (IN.)	PID Readings for Soils (ppm) 1 2 3 4	ADDITIONAL LAB. TESTING	MONITORING INSTALLATIONS: 880-MW2
0	Rig: B-53 Method: 4 1/4" Hollow Stem Auger	ground surface		0.0						Flush Box
		TOPSOIL								Concrete
1				1.0	1	35	12			
		Red-brown silty medium SAND								2" PVC Casing (0-3.5'bg)
2				2.0						Bentonite Seal
3					2	15	10			
4										
5					3	19	14			
		Light brown silty fine to medium SAND								
8										#2 Morey Sand
7					4	37	18			
8										
		(ROCK @ 8')								2" Slotted PVC Screen (2"x10') (3.5-13.5'bg)
9				9.0	5	15	15			Groundwater @ 9'bg
10										SOIL SAMPLE 8-10' PNA,VOC
11		Light brown silty fine SAND			6	8	75			SOIL SAMPLE 10-12' PNA,VOC
12										
13		BEDROCK								
		EOH @ 13.5 ft.		13.5						
14										
15										
16										

DATA INPUT: RRB

DEPTH SCALE

1 inch to 2 feet

Golder Associates

LOGGED: S. Chapman

CHECKED:

PROJECT: 973-6825.002

RECORD OF BOREHOLE 4770880-MW3

SHEET 1 OF 1

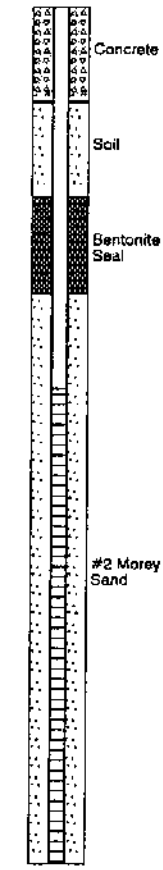
LOCATION: Northfield, VT PIN 4770880

BORING DATE: 12/16/97

DATUM: local

DRILLER: Capital Environmental Drilling

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	BLOWS/FT	RECOV. (IN.)	PID Readings for Soils (ppm) 1 2 3 4	ADDITIONAL LAB. TESTING	MONITORING INSTALLATIONS: 880-MW3
0	Fig. B-53 Method: 4 1/4" Hollow Stem Auger	ground surface								
		5" Topsoil		0.0	1	40	14	O		Flush Box
1										
2										2" PVC Casing (0-4'bg)
3										
4		GRAVEL, light grey sand								
5										
6					2	15	75	O		SOIL SAMPLE 5-7' PNA,VOC
7				7.0						2" Slotted PVC Screen (2'x5') (4-9'bg)
8		Light brown silty fine SAND								
9		EOH @ 9 ft. BEDROCK		9.0						
10										
11										
12										
13										
14										
15										
16										



DATA INPUT: RRB

DEPTH SCALE
1 inch to 2 feet

Golder Associates

LOGGED: S. Chapman

CHECKED:

PROJECT: 973-6825.002

LOCATION: Northfield, VT PIN 4770880

RECORD OF BOREHOLE 4770880-MW5

SHEET 1 OF 1

BORING DATE: 12/16/97

DATUM: local

DRILLER: Capital Environmental Drilling

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	BLOWS/FT	RECOV. (IN.)	PID Readings for Soils (ppm)	ADDITIONAL LAB TESTING	MONITORING INSTALLATIONS: 880-MW5
0	Rig: B-53 Method:4 1/4"Hollow Stem Auger	ground surface		0.0						Flush Box
1					1	27	14			Concrete
2		Light brown medium to coarse SAND, little gravel								2" PVC Casing (0-3'bg)
3										Bentonite Seal
4				4.0						
5										
6					2	23	12			
7										Groundwater @ 7'bg
8		Light brown silty fine SAND								#2 Morey Sand
9										2" Slotted PVC Screen (2"x10') (3-13'bg)
10										
11				11.0	3	30	14			SOIL SAMPLE 10-12' PNA,VOC
12		Light brown silty fine SAND, little red-brown till								
13		(BEDROCK) EOH @ 13 ft.		13.0						
14										
15										
16										

DATA IN-PUT: RRB

DEPTH SCALE

1 Inch to 2 feet

Golder Associates

LOGGED: S. Chapman

CHECKED:

PROJECT: 973-6825.002

LOCATION: Northfield, VT PIN 4770880

RECORD OF BOREHOLE 4770880-MW6

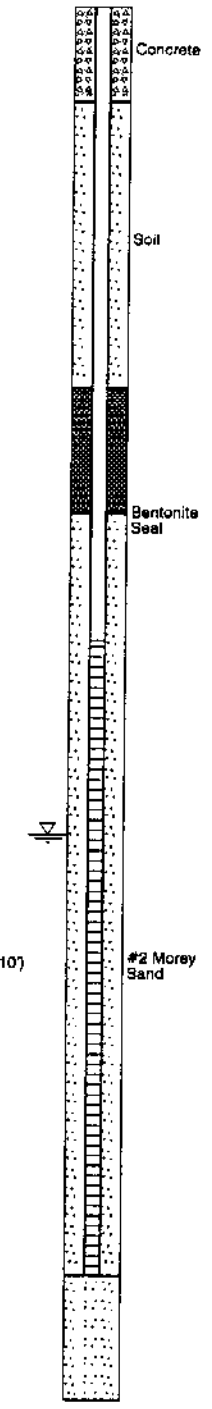
SHEET 1 OF 1

BORING DATE: 12/17/97

DATUM: local

DRILLER: Capital Environmental Drilling

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	BLOWS/FT	RECOV. (IN.)	PID Readings for Soils (ppm)	ADDITIONAL LAB. TESTING	MONITORING INSTALLATIONS: 880-MW6
0	Rig: B-53 Method: 4 1/4" Hollow Stem Auger	ground surface								Flush Box
		6" Topsoil Coal residue		0.0						
1				1.0	1	14	20			
2										2" PVC Casing (0-10'bg)
3										
4										
5										
6					2	12	18			
7										
8										
9		Light brown silty fine SAND								
10										
11					3	14	16			
12										
13										Groundwater @ 13'bg
14										
15										2" Slotted PVC Screen (2"x10') (10-20'bg)
16					4	10	18			
17				17.0						
18										
19		Brown silty fine SAND								
20										
21					5	27	14			SOIL SAMPLE 20-22' PNA,VOC
22		BEDROCK @ 22 ft.		22.0						
23										
24										



DATA INPUT: RRB

DEPTH SCALE

1 inch to 3 feet

Golder Associates

LOGGED: S. Chapman

CHECKED:

PROJECT: 973-6825.002

LOCATION: Northfield, VT PIN 4770880

RECORD OF BOREHOLE 4770880-MW7

SHEET 1 OF 1

BORING DATE: 12/17/97

DATUM: local

DRILLER: Capital Environmental Drilling

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES: NUMBER	BLOWS/FT	RECOV. (IN.)	PID Readings for Soils (ppm) 20 40 60 80	ADDITIONAL LAB. TESTING	MONITORING INSTALLATIONS: 880-MW7
0	Rig: B-53 Method 4 1/4"Hollow Stem Auger	ground surface								
		8" Topsoil		0.0						Flush Box
1		Coal residue			1	35/ 9"	10			Concrete
2				2.0						Bentonite Seal
3										2" PVC Casing (0-3'bg)
4										Groundwater @ 4'bg
5										
6					2	15	18			SOIL SAMPLE 5-7' PNA,VOC
7										
8		Light brown silty fine SAND								2" Slotted PVC Screen (2"x10') (3-13'bg)
9										#2 Morey Sand
10										
11					3	17	18			
12										
13										
14		EOH @ 14 ft.		14.0						
15										
16					4	9	75			

DATA INPUT: RFB

DEPTH SCALE

1 inch to 2 feet

Golder Associates

LOGGED: S. Chapman

CHECKED:

PROJECT: 973-6825.002

LOCATION: Northfield, VT PIN 4770880

RECORD OF BOREHOLE 4770880-MW8

SHEET 1 OF 1

BORING DATE: 12/17/97

DATUM: local

DRILLER: Capital Environmental Drilling

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	BLOWS/FT	RECOV. (IN.)	PID Readings for Soils (ppm)	ADDITIONAL LAB. TESTING	MONITORING INSTALLATIONS: 880-MW8
0	Rig: B-53 Method: 4 1/4" Hollow Stem Auger	ground surface		0.0						Flush Box
1		Coal residue			1	19	12			Concrete; Bentonite Seal
2										2" PVC Casing (0-3'bg)
3				3.0						
4		Brown silty fine to medium SAND								Groundwater @ 4'bg
5										
6				6.0	2	20	16			SOIL SAMPLE 5-7' PNA,VOC
7										#2 Morey Sand
8										2" Slotted PVC Screen (2'x10') (3-13'bg)
9										
10		Brown silty fine SAND								
11					3	8	18			
12										
13		BEDROCK								
		EOH @ 13 ft.		13.0						
14										
15										
16										

DATA INPUT: RRB

DEPTH SCALE

1 inch to 2 feet

Golder Associates

LOGGED: S. Chapman

CHECKED:

PROJECT: 973-6825.002

LOCATION: Northfield, VT PIN 4770880

RECORD OF BOREHOLE 4770880-MW9

SHEET 1 OF 1

BORING DATE: 12/18/97

DATUM: local

DRILLER: Capital Environmental Drilling

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	BLOWS/FT	RECOV. (IN.)	PID Readings for Soils (ppm) 20 40 60 80	ADDITIONAL LAB TESTING	MONITORING INSTALLATIONS: 880-MW9
0	Rig: B-53 Method:4 1/4"Hollow Stem Auger	ground surface								
		6" road base		0.0						Flush Box
1		Brown SAND, little gravel			1	20/2"	0	O		2" PVC Casing (0-2.5'bg)
2				2.0						
3		Coal residue, large rock								
4				4.0						2" Slotted PVC Screen (2"x3') (2.5-5.5'bg)
5		Dark brown medium SAND								Groundwater @ 5'bg
		BEDROCK			2	50/2"	6	O		SOIL SAMPLE 5-5.5' PNA,VOC
		EOH @ 5.5 ft.		5.5						
6										
7										
8										

Concrete

Bentonite Seal

#2 Morey Sand

DATA INPUT: RRB

DEPTH SCALE

1 inch to 1 feet

Golder Associates

LOGGED: S. Chapman

CHECKED:

PROJECT: 973-6825.002

LOCATION: Northfield, VT PIN 4770880

RECORD OF BOREHOLE 4770880-MW10

SHEET 1 OF 1

BORING DATE: 12/12/97

DATUM: local

DRILLER: Capital Environmental Drilling

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (ft)	SAMPLES: NUMBER	BLOWS/FT	RECOV. (IN.)	PID Readings for Soils (ppm)	ADDITIONAL LAB. TESTING	MONITORING INSTALLATIONS: 880-MW10
0	Rig: CME 550X Method: 4 1/4"Hollow Stem Auger	ground surface								
		3" Topsoil		0.0						Flush Box
1		Light brown silty fine SAND			1	11	18	O		2" PVC Casing (0-2'bg)
2				2.0						
3										#2 Morey Sand
4		Weathered bedrock and brown sand								2" Slotted PVC Screen (2'x4') (2-6'bg)
5										Groundwater @ 5'bg
					2	50/ 5"	12	O		SOIL SAMPLE 5-6' PNA,VOC
6		BEDROCK								
		EOH @ 6 ft.		6.0						
7										
8										

Concrete

Bentonite Seal

DATA INPUT: RRB

DEPTH SCALE

1 inch to 1 feet

Golder Associates

LOGGED: S. Chapman

CHECKED:

PROJECT: 973-6825.002

LOCATION: Northfield, VT. PIN 4770880

RECORD OF BOREHOLE 4770880-MW11

SHEET 1 OF 1

BORING DATE: 12/17/97

DATUM: local

DRILLER: Capital Environmental Drilling

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	BLOWS/FT	RECOV. (IN.)	PID Readings for Soils (ppm)	ADDITIONAL LAB. TESTING	MONITORING INSTALLATIONS: 880-MW11
0	Rig: B-53 Method 4 1/4"Hollow Stem Auger	ground surface								
0		4" asphalt		0.0	1	REF	0	O		Flush Box
1										Concrete
2		Dark brown silty fine to medium SAND								
3										2" PVC Casing (0-15'bg)
4				4.0						
5					2	39	18	O		
6										Soil
7										
8										
9		Light brown silty fine SAND								
10										
11					3	19	18	O		
12										Bentonite Seal
13										
14										
15				15.0						
16					4	17	18	O		Groundwater @ 16'bg
17										SOIL SAMPLE 15-17' PNA,VOC
18										
19										
20		Light brown silty fine to medium SAND								#2 Morey Sand
21					5	14	20	O		2" Slotted PVC Screen (2"x10') (15-25'bg)
22										
23										
24										
25		BEDROCK								
25		EOH @ 13 ft.		25.0						
26					6	0	20	O		
27										
28										
29										
30										
31										
32										

DATA INPUT: RRB

DEPTH SCALE

1 inch to 4 feet

Golder Associates

LOGGED: S. Chapman

CHECKED:

PROJECT: 973-6825.002

LOCATION: Northfield, VT PIN 4770880

RECORD OF BOREHOLE 4770880-MW12

SHEET 1 OF 1

BORING DATE: 12/17/97

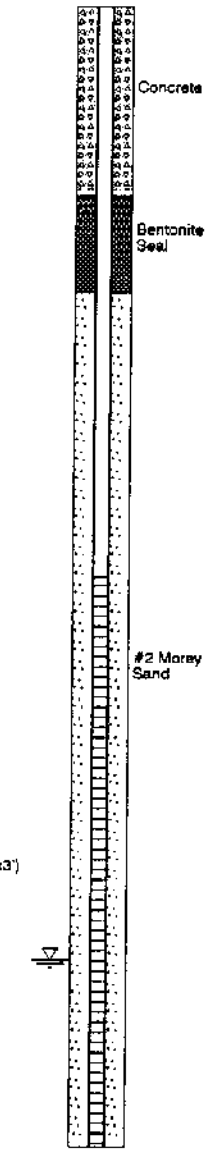
DATUM: local

DRILLER: Capital Environmental Drilling

DEPTH SCALE FEET	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (ft)	SAMPLES: NUMBER	BLOWS/FT	RECOV. (IN.)	PID Readings for Soils (ppm)	ADDITIONAL LAB. TESTING
0	Rig B-53 Mailhoo 4 1/4"Hollow Stem Auger	ground surface		0.0					
1					1	35	16		
2		Light brown medium SAND, little gravel							
3									
4				4.0					
5		Light brown weathered rock			2	50/5"	4		
6		EOH @ 6 ft. BEDROCK		6.0					
7									
8									

MONITORING INSTALLATIONS

880-MW12



DATA INPUT: RAB

DEPTH SCALE

1 inch to 1 feet

Golder Associates

LOGGED: S. Chapman

CHECKED:

APPENDIX C
GRAIN SIZE ANALYSES

GRAIN SIZE DISTRIBUTION TEST DATA

Client: Golder Associates Inc.
Project: Golder Project
Project Number: 17697.000

Sample Data

Source:
Sample No.: 880
Elev. or Depth:
Location:
Description:
Liquid Limit:
USCS Classification:
Testing Remarks:

Sample Length (in./cm.):

Plastic Limit:
AASHTO Classification:

Mechanical Analysis Data

	Initial
Dry sample and tare=	70.86
Tare =	25.13
Dry sample weight =	45.73

Tare for cumulative weight retained= .00

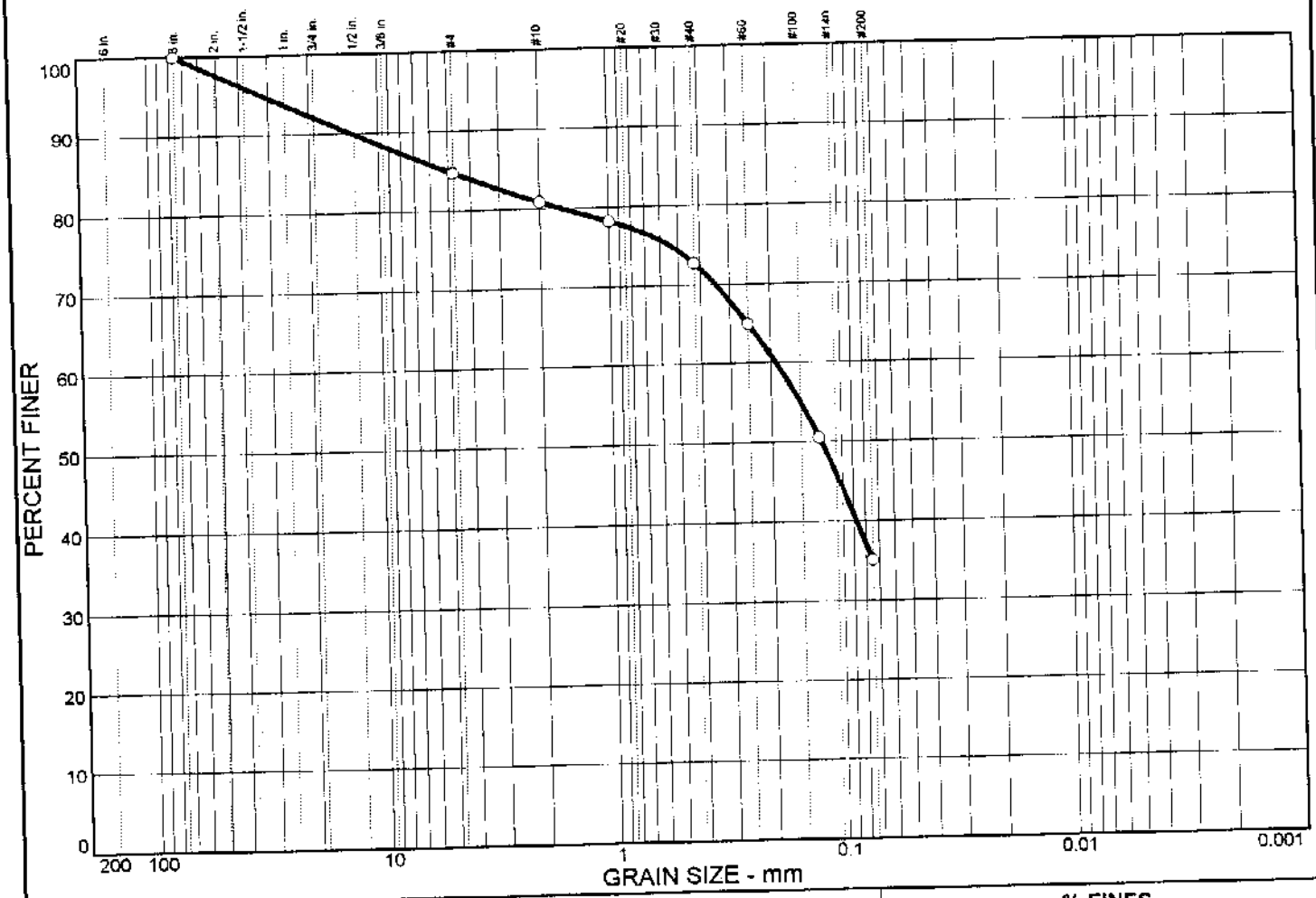
Sieve	Cumul. Wt. retained	Percent finer
3 inch	0.00	100.0
# 4	7.02	84.7
# 10	8.78	80.8
# 18	9.95	78.2
# 40	12.47	72.7
# 60	16.07	64.9
# 120	22.65	50.5
# 200	29.71	35.0

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = 0.0 % GRAVEL = 15.3 (% coarse = 8.0 % fine = 7.3)
% SAND = 49.7 (% coarse = 3.9 % medium = 8.1 % fine = 37.7)
% FINES = 35.0

D_{85}= 5.05 D_{60}= 0.19 D_{50}= 0.12

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0.0	8.0	7.3	3.9	8.1	37.7	35.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			5.05	0.190	0.123					

MATERIAL DESCRIPTION	USCS	AASHTO
○		

Project No. 17697.000 **Client:** Golder Associates Inc.

Project: Golder Project

○ **Source:** **Sample No.:** 880

Remarks:

○ F.M.=0.15

PARTICLE SIZE DISTRIBUTION TEST REPORT

NORMANDEAU ASSOCIATES

25 Nashua Road - Bedford, NH 03110

Sample No#

APPENDIX D
HYDRAULIC CONDUCTIVITY ESTIMATES

APPENDIX D

Hydraulic Conductivity Estimate

See Section 4.5 of report for details on hydraulic conductivity (K) estimate. The estimate is based on Freeze and Cherry (1979).

$$K = 1 \text{ X } 10^{-4} \text{ cm/s}$$

Conversion:

$$\left(1 \times 10^{-4} \frac{\text{cm}}{\text{s}}\right)\left(\frac{\text{in}}{2.54\text{cm}}\right)\left(\frac{\text{ft}}{12\text{in}}\right)\left(\frac{3600\text{sec}}{\text{hr}}\right)\left(\frac{24\text{hr}}{\text{day}}\right) = 0.283\frac{\text{ft}}{\text{day}}$$

Average Linear Velocity Estimate

Average linear groundwater velocity can be estimated with the following equation obtained from Freeze and Cherry (1979):

$$v = \frac{Ki}{n}$$

where,

v = average linear velocity,
K = hydraulic conductivity,
n = estimated porosity, and
i= hydraulic gradient

The porosity of the aquifer materials has been estimated as 29% based upon sample particle size distribution. Hydraulic conductivity is estimated at 0.283 ft/day and the hydraulic gradient was estimated at 0.066 ft./ft. This yields an estimated average linear groundwater velocity of 0.065 feet per day.

$$v = \frac{0.283\frac{\text{ft}}{\text{day}}}{0.29}\left(0.067\frac{\text{ft}}{\text{ft}}\right) = 0.065\frac{\text{ft}}{\text{day}}$$

Golder Associates

SUBJECT Hyd Cond + Sat Porosity PST

Job No. Ref. | Made by Checked Reviewed | Date Sheet of

PIN #	Site Name	Sample class	K (cm/s)	D_{50} mm	ϕ_e
896	Willimantic	Sand	10^{-2}	.73	.21
926	New London Roundhse	Silty Sand	10^{-5}	.11	.29
873	Mansfield	Sand and gravel	10^{-1}	3.07	.16
898	Stafford Spgs	Sand	10^{-3}	.47	.25
874	Essex Jct	Silty Sand	10^{-4}	.46	.25
878	Sharon	Sandy silt	10^{-6}		.30
904	WRJ	sandy silt	10^{-6}		.30
877	Hartford Roundhse	Sand	10^{-3}	.22	.28
910	Northfield	Silty sand some gravel	10^{-4}	.23	.26
880	Northfield	Silty sand	10^{-4}	.12	.29
868	St Albans	Silty Sand	10^{-5}	.14	.29
892	St Albans	Silty sand some g	10^{-4}	.47	.25
961909	Randolph	silty Sand	10^{-5}	.08	.32
870	New London pier	Silty Sand	10^{-4}	.46	.25

Table 2.2 Range of Values of Hydraulic Conductivity and Permeability

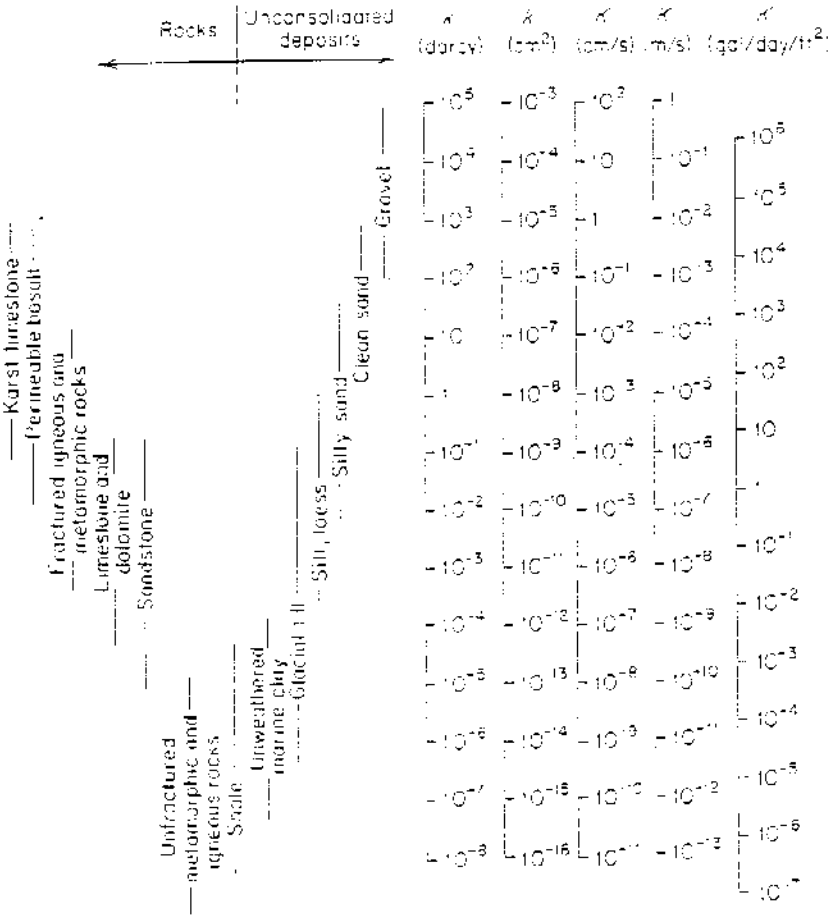


Table 2.3 Conversion Factors for Permeability and Hydraulic Conductivity Units

	Permeability, k*			Hydraulic conductivity, K		
	cm^2	ft^2	darcy	m/s	ft/s	U.S. gal/day/ft^2
cm^2	1	1.08×10^{-3}	1.01×10^{8}	9.80×10^{4}	3.22×10^{3}	1.85×10^{9}
ft^2	9.29×10^{2}	1	9.42×10^{10}	9.11×10^{7}	2.99×10^{6}	1.71×10^{12}
darcy	9.87×10^{-9}	1.06×10^{-11}	1	9.66×10^{-4}	3.17×10^{-5}	1.82×10^{1}
m/s	1.02×10^{-5}	1.10×10^{-8}	1.04×10^{3}	1	3.28	2.12×10^{4}
ft/s	3.11×10^{-4}	3.35×10^{-7}	3.15×10^{4}	3.05×10^{-1}	1	6.46×10^{3}
U.S. gal/day/ft^2	5.42×10^{-10}	5.83×10^{-13}	5.49×10^{-2}	4.72×10^{-5}	1.55×10^{-4}	1

*To obtain k in ft^2, multiply k in cm^2 by 1.08×10^{-3}.

R Allan Freeze and John A. Cherry

Quantitative Hydrogeology

Groundwater Hydrology for Engineers

Ghislain de Marsily
PARIS SCHOOL OF MINES
FONTAINEBLEAU, FRANCE

Translated by
Gunilla de Marsily

1986

ACADEMIC PRESS, INC.
Harcourt Brace Jovanovich, Publishers
Orlando San Diego New York Austin
London Montreal Sydney Tokyo Toronto

Medium	Total porosity
Unaltered granite and gneiss	0.02–1.8%
Quartzites	0.8%
Shales, slates, mica-schists	0.5–7.5%
Limestones, primary dolomites	0.5–12.5%
Secondary dolomites	10–30%
Chalk	8–37%
Sandstones	3.5–38%
Volcanic tuff	30–40%
Sands	15–48%
Clays	44–53%
Swelling clays, silt	Up to 90%
Tilled arable soils	45–65%

As a general rule, the smaller the grains in a rock, the greater the decrease in effective porosity and the increase in the retention capacity, as illustrated by Fig. 2.17. However, this must be used with caution for determining the porosity as a function of the grain size. (For instance, it hardly lends itself to the interpretation of King's experiments.)

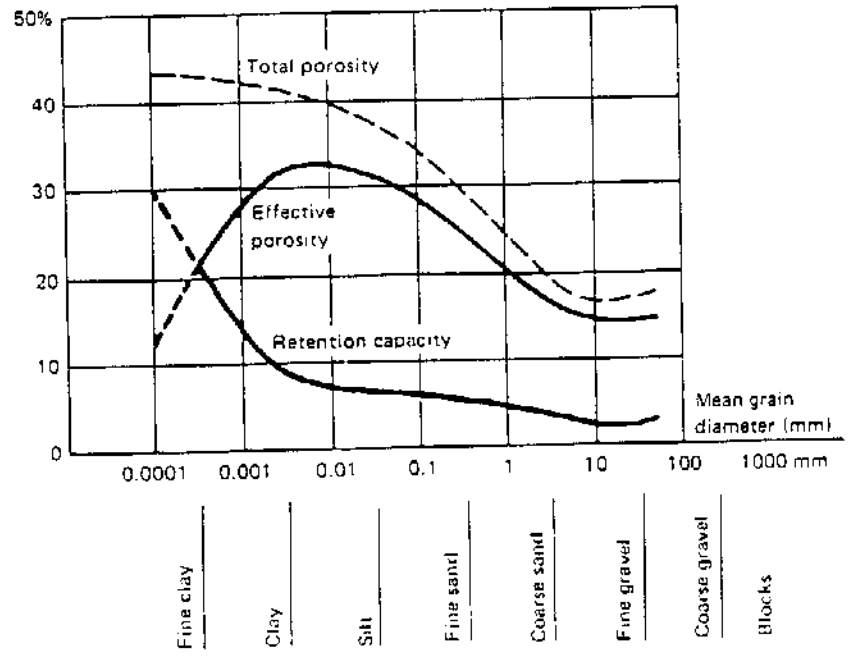


Fig. 2.17. Porosity components as a function of grain size. [After Castany (1967)].

APPENDIX E

LABORATORY ANALYTICAL REPORTS AND CHAIN-OF-CUSTODY FORMS

PHILIP SERVICES CORP.

Analytical Services

Certificate of Analysis

CLIENT INFORMATION

Attention: Jim Barrett
Client Name: Golder Associates
Project: 973-6825
Project Desc:

Address: 400 Commercial Street
Manchester, New Hampshire
3101
Fax Number: 603-668-1199
Phone Number: 603-668-0880

LABORATORY INFORMATION

Contact: M. Johnson, B.A., B.Sc.
Project: AN971285
Date Received: 97/12/20
Date Reported: 98/01/09

Submission No.: 7L0679
Sample No.: 061292-061298

NOTES: *'-' = not analysed '<' = less than Method Detection Limit (MDL) 'NA' = no data available*
LOQ can by determined for all analytes by multiplying the appropriate MDL X 3.33
Solids data is based on dry weight except for biota analyses.
Organic analyses are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)

Methods used by PASC are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Seventeenth Edition. Other methods are based on the principles of MISA or EPA methodologies. New York State: ELAP Identification Number 10756.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at PASC for a period of three weeks from receipt of data or as per contract.

COMMENTS:

Certified by: _____

5555 North Service Road • Burlington, ON, Canada L7L 5H7 • (905) 332-8788 • Fax (905) 332-9169

PASC - Certificate of Analysis

			Method Blank	Method Blank	Method Blank	Method Blank	Method Blank	SS-1-878
	Client ID:							
	Lab No.:		061292 97	061292 97	061292 97	061292 97	061292 97	061293 97
	Date Sampled:		97/12/18	97/12/18	97/12/18	97/12/18	97/12/18	97/12/18
Component	**MDL**	**Units**		M. Spike	MS % Rec.	MS Dup	MSD % Rec.	
Chloromethane	0.004	mg/kg	<	0.20	78	-	-	<
Vinyl Chloride	0.002	"	<	0.19	75	-	-	<
romomethane	0.005	"	<	0.24	96	-	-	<
Chloroethane	0.005	"	<	0.25	99	-	-	<
Trichlorofluoromethane	0.004	"	<	0.17	70	-	-	<
,1-Dichloroethylene	0.005	"	<	0.26	110	-	-	<
Methylene chloride	0.010	"	0.011	0.25	96	-	-	<0.013
trans-1,2-Dichloroethylene	0.003	"	<	0.22	86	-	-	<
,1-Dichloroethane	0.002	"	<	0.23	91	-	-	<
cis-1,2-Dichloroethylene	0.003	"	<	0.20	80	-	-	<
Chloroform	0.002	"	<	0.21	82	-	-	<
,1,1-Trichloroethane	0.003	"	<	0.22	88	-	-	<
,2-Dichloroethane	0.003	"	<	0.19	77	-	-	<
Carbon tetrachloride	0.006	"	<	0.23	91	-	-	<
Benzene	0.001	"	<	0.21	84	-	-	<
,2-Dichloropropane	0.003	"	<	0.20	80	-	-	<
Trichloroethylene	0.003	"	<	0.24	95	-	-	<
Bromodichloromethane	0.002	"	<	0.22	88	-	-	<
-Chloroethylvinyl ether	0.004	"	<	0.19	74	-	-	<
cis-1,3-Dichloropropylene	0.002	"	<	0.21	83	-	-	<
rans-1,3-Dichloropropylene	0.004	"	<	0.20	81	-	-	<
Toluene	0.002	"	<	0.24	97	-	-	<
1,1,2-Trichloroethane	0.002	"	<	0.20	78	-	-	<
Chlorodibromomethane	0.004	"	<	0.22	120	-	-	<
Ethylene dibromide	0.006	"	<	0.20	82	-	-	<
Tetrachloroethylene	0.002	"	<	0.23	93	-	-	<
Chlorobenzene	0.003	"	<	0.23	93	-	-	<
Ethyl Benzene	0.002	"	<	0.23	90	-	-	<
m&p-Xylene	0.002	"	<	0.46	92	-	-	<
Bromoform	0.004	"	<	0.21	82	-	-	<
Styrene	0.002	"	<	0.23	92	-	-	<
o-Xylene	0.002	"	<	0.24	95	-	-	<
1,1,2,2-Tetrachloroethane	0.003	"	<	0.20	82	-	-	<
1,2-Dichlorobenzene	0.002	"	<	0.24	97	-	-	<
1,3-Dichlorobenzene	0.003	"	<	0.17	67	-	-	<
1,4-Dichlorobenzene	0.004	"	<	0.23	92	-	-	<
Surrogate Recoveries		%						
d4-1,2-Dichloroethane			88	87	87	-	-	87
d8-Toluene			102	106	106	-	-	98
Bromofluorobenzene			91	94	94	-	-	81

PASC - Certificate of Analysis

			Method Blank	Method Blank	Method Blank	Method Blank	Method Blank	SS-1-878
	Client ID:							
	Lab No.:		061292 97	061292 97	061292 97	061292 97	061292 97	061293 97
	Date Sampled:		97/12/18	97/12/18	97/12/18	97/12/18	97/12/18	97/12/18
Component	**MDL**	**Units**		M. Spike	MS % Rec.	MS Dup	MSD % Rec.	
Naphthalene	0.03	mg/kg	<	1.6	81	1.5	76	<0.06
Acenaphthylene	0.04	"	<	1.5	77	1.5	77	<0.08
Acenaphthene	0.07	"	<	1.6	79	1.6	79	<0.14
Fluorene	0.03	"	<	1.5	77	1.5	75	<0.06
Phenanthrene	0.03	"	<	1.8	88	1.8	91	0.07
Anthracene	0.03	"	<	1.6	82	1.7	84	<0.06
Fluoranthene	0.02	"	<	1.9	95	1.8	92	0.37
Pyrene	0.03	"	<	1.7	86	1.7	86	0.99
Benz(a)anthracene	0.02	"	<	1.8	90	1.8	90	0.15
Chrysene	0.03	"	<	1.8	92	1.8	92	0.37
Benzo(b)fluoranthene	0.04	"	<	1.7	85	1.8	89	0.75
Benzo(k)fluoranthene	0.04	"	<	2.0	99	1.9	96	0.45
Benzo(a)pyrene	0.05	"	<	1.8	88	1.8	88	1.0
Indeno(1,2,3-cd)pyrene	0.06	"	<	1.4	70	1.6	80	0.37
Dibenzo(ah)anthracene	0.04	"	<	1.4	70	1.6	79	<0.08
Benzo(ghi)perylene	0.04	"	<	1.5	74	1.6	81	0.42
Surrogate Recoveries		%						
d5-Nitrobenzene			63	78	78	71	71	76
2-Fluorobiphenyl			70	78	78	76	76	83
d14-p-Terphenyl			92	91	91	92	92	101

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	Client ID:		SS-2-878	SS-3-878	MW-7-880	MW-9-880	SS-1-880
	Lab No.:		061294 97	061295 97	061296 97	061297 97	061298 97
	Date Sampled:		97/12/18	97/12/18	97/12/18	97/12/18	97/12/18
Component	**MDL**	**Units**					
Chloromethane	0.004	mg/kg	<	<	<	<	<
Vinyl Chloride	0.002	"	<	<	<	<	<
Bromomethane	0.005	"	<	<	<	<	<
Chloroethane	0.005	"	<	<	<	<	<
Trichlorofluoromethane	0.004	"	<	<	<	<	<
1,1-Dichloroethylene	0.005	"	<	<	<	<	<
Methylene chloride	0.010	"	<0.028	<	<	<	<
trans-1,2-Dichloroethylene	0.003	"	<	<	<	<	<
1,1-Dichloroethane	0.002	"	<	<	<	<	<
cis-1,2-Dichloroethylene	0.003	"	<	<	<	<	<
Chloroform	0.002	"	<	<	<	<	<
1,1,1-Trichloroethane	0.003	"	<	<	<	<	<
1,2-Dichloroethane	0.003	"	<	<	<	<	<
Carbon tetrachloride	0.006	"	<	<	<	<	<
Benzene	0.001	"	<	<	<	<	<
1,2-Dichloropropane	0.003	"	<	<	<	<	<
Trichloroethylene	0.003	"	<	<	<	<	<
Bromodichloromethane	0.002	"	<	<	<	<	<
2-Chloroethylvinyl ether	0.004	"	<	<	<	<	<
cis-1,3-Dichloropropylene	0.002	"	<	<	<	<	<
trans-1,3-Dichloropropylene	0.004	"	<	<	<	<	<
Toluene	0.002	"	<	<	<	0.005	<
1,1,2-Trichloroethane	0.002	"	<	<	<	<	<
Chlorodibromomethane	0.004	"	<	<	<	<	<
Ethylene dibromide	0.006	"	<	<	<	<	<
Tetrachloroethylene	0.002	"	<	<	<	<	<
Chlorobenzene	0.003	"	<	<	<	<	<
Ethyl Benzene	0.002	"	<	<	<	<	<
m&p-Xylene	0.002	"	<	<	<	0.023	<
Bromoform	0.004	"	<	<	<	<	<
Styrene	0.002	"	<	<	<	<	<
o-Xylene	0.002	"	<	<	<	<	<
1,1,2,2-Tetrachloroethane	0.003	"	<	<	<	<	<
1,2-Dichlorobenzene	0.002	"	<	<	<	<	<
1,3-Dichlorobenzene	0.003	"	<	<	<	<	<
1,4-Dichlorobenzene	0.004	"	<	<	<	<	<
Surrogate Recoveries		%					
d4-1,2-Dichloroethane			85	88	89	88	94
d8-Toluene			102	99	99	102	102
Bromofluorobenzene			99	82	101	109	85

PASC - Certificate of Analysis

	Client ID:		SS-2-878	SS-3-878	MW-7-880	MW-9-880	SS-1-880
	Lab No.:		061294 97	061295 97	061296 97	061297 97	061298 97
	Date Sampled:		97/12/18	97/12/18	97/12/18	97/12/18	97/12/18
Component	**MDL**	**Units**					
Naphthalene	0.03	mg/kg	<0.30	<	13	0.11	0.23
Acenaphthylene	0.04	"	<0.40	<	<4.0	<	0.08
Acenaphthene	0.07	"	0.66	<	<7.0	<	<
Fluorene	0.03	"	<0.30	<	9.6	0.11	0.08
Phenanthrene	0.03	"	<0.30	0.03	20	0.36	1.4
Anthracene	0.03	"	<0.30	<	<3.0	0.06	0.18
Fluoranthene	0.02	"	1.1	0.17	<2.0	0.17	1.9
Pyrene	0.03	"	5.6	0.14	<3.0	0.11	1.3
Benz(a)anthracene	0.02	"	<0.20	0.10	0.14	0.06	0.77
Chrysene	0.03	"	0.43	0.14	0.21	0.06	1.1
Benzo(b)fluoranthene	0.04	"	<0.40	0.13	0.06	<	0.98
Benzo(k)fluoranthene	0.04	"	<0.40	0.12	<	0.06	0.75
Benzo(a)pyrene	0.05	"	0.11	0.09	<	0.06	0.79
Indeno(1,2,3-cd)pyrene	0.06	"	<0.60	<	<	<	0.68
Dibenzo(ah)anthracene	0.04	"	<0.40	<	<	<	0.11
Benzo(ghi)perylene	0.04	"	<0.40	<	<	<	0.55
Surrogate Recoveries		%					
d5-Nitrobenzene			76	65	86	62	59
2-Fluorobiphenyl			79	70	86	64	64
d14-p-Terphenyl			96	87	119	85	88

PHILIP SERVICES CORP.

Analytical Services

Certificate of Analysis

CLIENT INFORMATION

Attention: Jim Barrett
Client Name: Golder Associates
Project: 973-6825
Project Desc:

Address: 400 Commercial Street
Manchester, New Hampshire
03101
Fax Number: 603-668-1199
Phone Number: 603-668-0880

LABORATORY INFORMATION

Contact: M. Johnson, B.A., B.Sc.
Project: AN971285
Date Received: 97/12/20
Date Reported: 98/01/09

Submission No.: 7L0679
Sample No.: 061299

NOTES: *'-' = not analysed '<' = less than Method Detection Limit (MDL) 'NA' = no data available*
LOQ can by determined for all analytes by multiplying the appropriate MDL X 3.33
Solids data is based on dry weight except for biota analyses.
Organic analyses are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)

Methods used by PASC are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Seventeenth Edition. Other methods are based on the principles of MISA or EPA methodologies. New York State: ELAP Identification Number 10756.

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COMMENTS:

Certified by: _____

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PASC - Certificate of Analysis

			Trip Blank
	Client ID:		
	Lab No.:		061299 97
	Date Sampled:		97/12/18
Component	**MDL**	**Units**	
Chloromethane	1.0	ug/L	<
Vinyl Chloride	0.7	"	<
Bromomethane	0.6	"	<
Chloroethane	1.0	"	<
Trichlorofluoromethane	1.8	"	<
1,1-Dichloroethylene	0.6	"	<
Methylene chloride	0.7	"	<
trans-1,2-Dichloroethylene	1.6	"	<
1,1-Dichloroethane	0.5	"	<
cis-1,2-Dichloroethylene	0.6	"	<
Chloroform	0.4	"	<
1,1,1-Trichloroethane	0.3	"	<
1,2-Dichloroethane	0.7	"	<
Carbon tetrachloride	0.3	"	<
Benzene	0.3	"	<
1,2-Dichloropropane	0.5	"	<
Trichloroethylene	0.3	"	<
Bromodichloromethane	0.5	"	<
2-Chloroethylvinyl ether	1.5	"	<
cis-1,3-Dichloropropylene	1.0	"	<
trans-1,3-Dichloropropylene	1.0	"	<
Toluene	0.4	"	<
1,1,2-Trichloroethane	0.4	"	<
Chlorodibromomethane	0.6	"	<
Ethylene Dibromide	0.4	"	<
Tetrachloroethylene	0.4	"	<
Chlorobenzene	0.3	"	<
Ethylbenzene	0.3	"	<
m&p-Xylene	0.8	"	<
Bromoform	0.5	"	<
Styrene	0.4	"	<
o-Xylene	0.4	"	<
1,1,2,2-Tetrachloroethane	0.6	"	<
1,2-Dichlorobenzene	0.3	"	<
1,3-Dichlorobenzene	0.4	"	<
1,4-Dichlorobenzene	0.4	"	<
Surrogate Recoveries		%	
d4-Dichloroethane			89
d8-Toluene			107
Bromofluorobenzene			81

PHILIP SERVICES CORP.

Analytical Services

Certificate of Analysis

CLIENT INFORMATION

Attention:	Jim Barrett
Client Name:	Golder Associates
Project:	973-6825
Project Desc:	
Address:	400 Commercial Street Manchester, New Hampshire 3101
Fax Number:	603-668-1199
Phone Number:	603-668-0880

LABORATORY INFORMATION

Contact:	M. Johnson, B.A., B.Sc.
Project:	AN971285
Date Received:	97/12/20
Date Reported:	98/01/07
Submission No.:	7L0679
Sample No.:	061292-061298

NOTES: *'-' = not analysed '<' = less than Method Detection Limit (MDL) 'NA' = no data available*
LOQ can by determined for all analytes by multiplying the appropriate MDL X 3.33
Solids data is based on dry weight except for biota analyses.
Organic analyses are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)

Methods used by PASC are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Seventeenth Edition. Other methods are based on the principles of MISA or EPA methodologies. New York State: ELAP Identification Number 10756.

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COMMENTS:

Preliminary Report

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PHILIP SERVICES CORP.

Analytical Services

Certificate of Analysis

CLIENT INFORMATION

Attention: Jim Barrett
Client Name: Golder Associates
Project: 973-6825
Project Desc:

Address: 400 Commercial Street
Manchester, New Hampshire
03101
Fax Number: 603-668-1199
Phone Number: 603-668-0880

LABORATORY INFORMATION

Contact: M. Johnson, B.A., B.Sc.
Project: AN971285
Date Received: 97/12/19
Date Reported: 98/01/07

Submission No.: 7L0648
Sample No.: 061061-061088

NOTES: *'-' = not analysed '<' = less than Method Detection Limit (MDL) 'NA' = no data available*
LOQ can by determined for all analytes by multiplying the appropriate MDL X 3.33
Solids data is based on dry weight except for biota analyses.
Organic analyses are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)

Methods used by PASC are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Seventeenth Edition. Other methods are based on the principles of MISA or EPA methodologies. New York State: ELAP Identification Number 10756.

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COMMENTS:

Certified by: M. Johnson

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PASC - Certificate of Analysis

			Method Blank	Method Blank	Method Blank	Method Blank	Method Blank
	Client ID:						
	Lab No.:		061061 97	061061 97	061061 97	061061 97	061061 97
	Date Sampled:		97/12/15	97/12/15	97/12/15	97/12/15	97/12/15
Component	**MDL**	**Units**		M. Spike	MS % Rec.	MS Dup	MSD % Rec.
Chloromethane	1.0	ug/L	<	46	92	-	-
Vinyl Chloride	0.7	"	<	48	97	-	-
Bromomethane	0.6	"	<	47	93	-	-
Chloroethane	1.0	"	<	50	99	-	-
Trichlorofluoromethane	1.8	"	<	46	92	-	-
1,1-Dichloroethylene	0.6	"	<	52	110	-	-
Methylene chloride	0.7	"	2.1	47	93	-	-
trans-1,2-Dichloroethylene	1.6	"	<	46	92	-	-
1,1-Dichloroethane	0.5	"	<	46	91	-	-
cis-1,2-Dichloroethylene	0.6	"	<	43	86	-	-
Chloroform	0.4	"	<	44	89	-	-
1,1,1-Trichloroethane	0.3	"	<	46	93	-	-
1,2-Dichloroethane	0.7	"	<	39	79	-	-
Carbon tetrachloride	0.3	"	<	47	94	-	-
Benzene	0.3	"	<	47	94	-	-
1,2-Dichloropropane	0.5	"	<	43	86	-	-
Trichloroethylene	0.3	"	<	48	96	-	-
Bromodichloromethane	0.5	"	<	45	89	-	-
2-Chloroethylvinyl ether	1.5	"	<	42	83	-	-
cis-1,3-Dichloropropylene	1.0	"	<	42	84	-	-
trans-1,3-Dichloropropylene	1.0	"	<	40	80	-	-
Toluene	0.4	"	<	48	96	-	-
1,1,2-Trichloroethane	0.4	"	<	43	86	-	-
Chlorodibromomethane	0.6	"	<	44	89	-	-
Ethylene Dibromide	0.4	"	<	44	88	-	-
Tetrachloroethylene	0.4	"	<	41	82	-	-
Chlorobenzene	0.3	"	<	47	94	-	-
Ethylbenzene	0.3	"	<	47	95	-	-
m&p-Xylene	0.8	"	<	97	97	-	-
Bromoform	0.5	"	<	34	78	-	-
Styrene	0.4	"	<	48	96	-	-
o-Xylene	0.4	"	<	47	94	-	-
1,1,2,2-Tetrachloroethane	0.6	"	<	41	82	-	-
1,2-Dichlorobenzene	0.3	"	<	41	81	-	-
1,3-Dichlorobenzene	0.4	"	<	47	94	-	-
1,4-Dichlorobenzene	0.4	"	<	40	80	-	-
Surrogate Recoveries		%					
d4-Dichloroethane			81	85	85	-	-
d8-Toluene			100	102	102	-	-
Bromofluorobenzene			82	80	80	-	-

PASC - Certificate of Analysis

			Method Blank	Method Blank	Method Blank	Method Blank	Method Blank
	Client ID:						
	Lab No.:		061061 97	061061 97	061061 97	061061 97	061061 97
	Date Sampled:		97/12/15	97/12/15	97/12/15	97/12/15	97/12/15
Component	**MDL**	**Units**		M. Spike	MS % Rec.	MS Dup	MSD % Rec.
Naphthalene	0.3	ug/L	<	13	65	17	84
Acenaphthylene	0.4	"	<	16	78	18	88
Acenaphthene	0.7	"	<	15	77	18	92
Fluorene	0.3	"	<	16	82	19	93
Phenanthrene	0.3	"	<	18	88	19	93
Anthracene	0.3	"	<	17	87	20	100
Fluoranthene	0.2	"	<	18	92	20	99
Pyrene	0.3	"	<	18	91	21	100
Benz(a)anthracene	0.2	"	<	19	96	21	100
Chrysene	0.3	"	<	19	97	22	110
Benzo(b)fluoranthene	0.4	"	<	20	98	21	100
Benzo(k)fluoranthene	0.4	"	<	19	96	21	100
Benzo(a)pyrene	0.5	"	<	19	94	20	100
Indeno(1,2,3-cd)pyrene	0.6	"	<	21	100	22	110
Dibenzo(ah)anthracene	0.4	"	<	20	100	21	100
Benzo(ghi)perylene	0.4	"	<	22	110	23	120
Surrogate Recoveries		%					
d5-Nitrobenzene			47	76	76	83	83
2-Fluorobiphenyl			44	63	63	76	76
d14-p-Terphenyl			62	71	71	74	74

PASC - Certificate of Analysis

	Client ID:		MW-1-888	MW-2-888	MW-3-888	MW-4-888	MW-4-888
	Lab No.:		061062 97	061063 97	061064 97	061065 97	061065 97
	Date Sampled:		97/12/15	97/12/15	97/12/15	97/12/15	97/12/15
Component	**MDL**	**Units**					M. Spike
Chloromethane	1.0	ug/L	<	<	<	<	43
Vinyl Chloride	0.7	"	<	<	<	<	45
Bromomethane	0.6	"	<	<	<	<	44
Chloroethane	1.0	"	<	<	<	<	46
Trichlorofluoromethane	1.8	"	<	<	<	<	44
1,1-Dichloroethylene	0.6	"	<	<	<	<	51
Methylene chloride	0.7	"	2.1	2.3	3.4	3.7	48
trans-1,2-Dichloroethylene	1.6	"	<	<	<	<	43
1,1-Dichloroethane	0.5	"	<	<	<	<	44
cis-1,2-Dichloroethylene	0.6	"	<	<	<	<	42
Chloroform	0.4	"	<	<	0.8	<	43
1,1,1-Trichloroethane	0.3	"	<	<	<	<	46
1,2-Dichloroethane	0.7	"	<	<	<	<	40
Carbon tetrachloride	0.3	"	<	<	<	<	45
Benzene	0.3	"	<	<	<	<	46
1,2-Dichloropropane	0.5	"	<	<	<	<	44
Trichloroethylene	0.3	"	<	<	<	<	43
Bromodichloromethane	0.5	"	<	<	<	<	47
2-Chloroethylvinyl ether	1.5	"	<	<	<	<	<
cis-1,3-Dichloropropylene	1.0	"	<	<	<	<	42
trans-1,3-Dichloropropylene	1.0	"	<	<	<	<	42
Toluene	0.4	"	<	<	<	<	49
1,1,2-Trichloroethane	0.4	"	<	<	<	<	46
Chlorodibromomethane	0.6	"	<	<	<	<	46
Ethylene Dibromide	0.4	"	<	<	<	<	50
Tetrachloroethylene	0.4	"	<	<	<	<	38
Chlorobenzene	0.3	"	<	<	<	<	46
Ethylbenzene	0.3	"	<	<	<	<	46
m&p-Xylene	0.8	"	<	<	<	<	90
Bromoform	0.5	"	<	<	<	<	36
Styrene	0.4	"	<	<	<	<	46
o-Xylene	0.4	"	<	<	<	<	48
1,1,2,2-Tetrachloroethane	0.6	"	<	<	<	<	49
1,2-Dichlorobenzene	0.3	"	<	<	<	<	40
1,3-Dichlorobenzene	0.4	"	<	<	<	<	42
1,4-Dichlorobenzene	0.4	"	<	<	<	<	37
Surrogate Recoveries		%					
d4-Dichloroethane			86	81	79	82	86
d8-Toluene			108	102	101	101	108
Bromofluorobenzene			83	80	80	82	94

PASC - Certificate of Analysis

	Client ID:		MW-1-888	MW-2-888	MW-3-888	MW-4-888	MW-4-888
	Lab No.:		061062 97	061063 97	061064 97	061065 97	061065 97
	Date Sampled:		97/12/15	97/12/15	97/12/15	97/12/15	97/12/15
Component	**MDL**	**Units**					M. Spike
Naphthalene	0.3	ug/L	<	<	<	<	-
Acenaphthylene	0.4	"	<	<	<	<	-
Acenaphthene	0.7	"	<	<	<	<	-
Fluorene	0.3	"	<	<	<	<	-
Phenanthrene	0.3	"	<	<	<	<	-
Anthracene	0.3	"	<	<	<	<	-
Fluoranthene	0.2	"	<	<	<	<	-
Pyrene	0.3	"	<	<	<	<	-
Benz(a)anthracene	0.2	"	<	<	<	<	-
Chrysene	0.3	"	<	<	<	<	-
Benzo(b)fluoranthene	0.4	"	<	<	<	<	-
Benzo(k)fluoranthene	0.4	"	<	<	<	<	-
Benzo(a)pyrene	0.5	"	<	<	<	<	-
Indeno(1,2,3-cd)pyrene	0.6	"	<	<	<	<	-
Dibenzo(ah)anthracene	0.4	"	<	<	<	<	-
Benzo(ghi)perylene	0.4	"	<	<	<	<	-
Surrogate Recoveries		%					
d5-Nitrobenzene			76	76	77	65	-
2-Fluorobiphenyl			80	74	79	75	-
d14-p-Terphenyl			87	89	85	95	-

PASC - Certificate of Analysis

						Trip
	Client ID:		MW-4-888	MW-4-888	MW-4-888	Blank
	Lab No.:		061065 97	061065 97	061065 97	061088 97
	Date Sampled:		97/12/15	97/12/15	97/12/15	97/12/17
Component	**MDL**	**Units**	MS % Rec.	MS Dup	MSD % Rec.	
Chloromethane	1.0	ug/L	86	47	93	<
Vinyl Chloride	0.7	"	90	46	91	<
Bromomethane	0.6	"	88	48	95	<
Chloroethane	1.0	"	91	51	100	<
Trichlorofluoromethane	1.8	"	88	46	92	<
1,1-Dichloroethylene	0.6	"	100	52	110	<
Methylene chloride	0.7	"	95	48	97	<
trans-1,2-Dichloroethylene	1.6	"	85	45	90	<
1,1-Dichloroethane	0.5	"	89	45	91	<
cis-1,2-Dichloroethylene	0.6	"	83	43	86	<
Chloroform	0.4	"	85	44	88	<
1,1,1-Trichloroethane	0.3	"	93	46	92	<
1,2-Dichloroethane	0.7	"	80	42	84	<
Carbon tetrachloride	0.3	"	91	45	89	<
Benzene	0.3	"	91	45	90	<
1,2-Dichloropropane	0.5	"	88	45	90	<
Trichloroethylene	0.3	"	86	42	85	<
Bromodichloromethane	0.5	"	94	47	93	<
2-Chloroethylvinyl ether	1.5	"	<	<	<	<
cis-1,3-Dichloropropylene	1.0	"	85	44	88	<
trans-1,3-Dichloropropylene	1.0	"	83	43	86	<
Toluene	0.4	"	98	48	96	<
1,1,2-Trichloroethane	0.4	"	91	46	91	<
Chlorodibromomethane	0.6	"	92	45	89	<
Ethylene Dibromide	0.4	"	99	47	93	<
Tetrachloroethylene	0.4	"	75	40	80	<
Chlorobenzene	0.3	"	93	48	97	<
Ethylbenzene	0.3	"	92	47	94	<
m&p-Xylene	0.8	"	90	95	95	<
Bromoform	0.5	"	72	36	72	<
Styrene	0.4	"	91	48	96	<
o-Xylene	0.4	"	96	48	96	<
1,1,2,2-Tetrachloroethane	0.6	"	97	46	92	<
1,2-Dichlorobenzene	0.3	"	80	41	82	<
1,3-Dichlorobenzene	0.4	"	83	44	88	<
1,4-Dichlorobenzene	0.4	"	73	37	74	<
Surrogate Recoveries		%				
d4-Dichloroethane			86	86	86	81
d8-Toluene			108	105	105	102
Bromofluorobenzene			94	93	93	81

						Trip
	Client ID:		MW-4-888	MW-4-888	MW-4-888	Blank
	Lab No.:		061065 97	061065 97	061065 97	061088 97
	Date Sampled:		97/12/15	97/12/15	97/12/15	97/12/17
Component	**MDL**	**Units**	MS % Rec.	MS Dup	MSD % Rec.	
Naphthalene	0.3	ug/L	-	-	-	-
Acenaphthylene	0.4	"	-	-	-	-
Acenaphthene	0.7	"	-	-	-	-
Fluorene	0.3	"	-	-	-	-
Phenanthrene	0.3	"	-	-	-	-
Anthracene	0.3	"	-	-	-	-
Fluoranthene	0.2	"	-	-	-	-
Pyrene	0.3	"	-	-	-	-
Benz(a)anthracene	0.2	"	-	-	-	-
Chrysene	0.3	"	-	-	-	-
Benzo(b)fluoranthene	0.4	"	-	-	-	-
Benzo(k)fluoranthene	0.4	"	-	-	-	-
Benzo(a)pyrene	0.5	"	-	-	-	-
Indeno(1,2,3-cd)pyrene	0.6	"	-	-	-	-
Dibenzo(ah)anthracene	0.4	"	-	-	-	-
Benzo(ghi)perylene	0.4	"	-	-	-	-
Surrogate Recoveries		%				
d5-Nitrobenzene			-	-	-	-
2-Fluorobiphenyl			-	-	-	-
d14-p-Terphenyl			-	-	-	-

PHILIP SERVICES CORP

Analytical Services

Certificate of Analysis

CLIENT INFORMATION

Attention:	Jim Barrett
Client Name:	Golder Associates
Project:	973-6825
Project Desc:	
Address:	400 Commercial Street Manchester, New Hampshire 3101
Fax Number:	603-668-1199
Phone Number:	603-668-0880

LABORATORY INFORMATION

Contact:	M. Johnson, B.A., B.Sc.
Project:	AN971285
Date Received:	97/12/19
Date Reported:	98/01/07
Submission No.:	7L0648
Sample No.:	061066-061077

NOTES: *'-' = not analysed '<' = less than Method Detection Limit (MDL) 'NA' = no data available*
LOQ can by determined for all analytes by multiplying the appropriate MDL X 3.33
Solids data is based on dry weight except for biota analyses.
Organic analyses are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)

Methods used by PASC are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Seventeenth Edition. Other methods are based on the principles of MISA or EPA methodologies. New York State: ELAP Identification Number 10756.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at PASC for a period of three weeks from receipt of data or as per contract.

COMMENTS:

Certified by: _____

5535 North Service Road • Burlington, ON, Canada L7L 5H7 • (905) 332-8788 • Fax (905) 332-9169

PASC - Certificate of Analysis

			Method Blank	Method Blank	Method Blank	Method Blank	Method Blank
	Client ID:						
	Lab No.:		061066 97	061066 97	061066 97	061066 97	061066 97
	Date Sampled:		97/12/12	97/12/12	97/12/12	97/12/12	97/12/12
Component	**MDL**	**Units**		M. Spike	MS % Rec.	MS Dup	MSD % Rec.
Chloromethane	0.004	mg/kg	<	0.25	98	-	-
Vinyl Chloride	0.002	"	<	0.22	89	-	-
Bromomethane	0.005	"	<	0.30	120	-	-
Chloroethane	0.005	"	<	0.29	120	-	-
Trichlorofluoromethane	0.004	"	<	0.20	80	-	-
1,1-Dichloroethylene	0.005	"	<	0.30	120	-	-
Methylene chloride	0.010	"	0.012	0.27	110	-	-
trans-1,2-Dichloroethylene	0.003	"	<	0.25	98	-	-
1,1-Dichloroethane	0.002	"	<	0.25	100	-	-
cis-1,2-Dichloroethylene	0.003	"	<	0.23	90	-	-
Chloroform	0.002	"	<	0.23	92	-	-
1,1,1-Trichloroethane	0.003	"	<	0.23	92	-	-
1,2-Dichloroethane	0.003	"	<	0.21	83	-	-
Carbon tetrachloride	0.006	"	<	0.24	95	-	-
Benzene	0.001	"	<	0.22	88	-	-
1,2-Dichloropropane	0.003	"	<	0.21	85	-	-
Trichloroethylene	0.003	"	<	0.23	92	-	-
Bromodichloromethane	0.002	"	<	0.23	93	-	-
2-Chloroethylvinyl ether	0.004	"	<	0.20	79	-	-
cis-1,3-Dichloropropylene	0.002	"	<	0.23	90	-	-
trans-1,3-Dichloropropylene	0.004	"	<	0.21	84	-	-
Toluene	0.002	"	<	0.25	100	-	-
1,1,2-Trichloroethane	0.002	"	<	0.20	82	-	-
Chlorodibromomethane	0.004	"	<	0.22	86	-	-
Ethylene dibromide	0.006	"	<	0.22	86	-	-
Tetrachloroethylene	0.002	"	<	0.24	95	-	-
Chlorobenzene	0.003	"	<	0.25	99	-	-
Ethyl Benzene	0.002	"	<	0.24	94	-	-
m&p-Xylene	0.002	"	<	0.48	95	-	-
Bromoform	0.004	"	<	0.20	80	-	-
Styrene	0.002	"	<	0.25	99	-	-
o-Xylene	0.002	"	<	0.24	98	-	-
1,1,2,2-Tetrachloroethane	0.003	"	<	0.21	84	-	-
1,2-Dichlorobenzene	0.002	"	<	0.25	99	-	-
1,3-Dichlorobenzene	0.003	"	<	0.25	98	-	-
1,4-Dichlorobenzene	0.004	"	<	0.24	95	-	-
Surrogate Recoveries		%					
d4-1,2-Dichloroethane			84	95	95	-	-
d8-Toluene			98	109	109	-	-
Bromofluorobenzene			84	95	95	-	-

			Method Blank	Method Blank	Method Blank	Method Blank	Method Blank
	Client ID:						
	Lab No.:		061066 97	061066 97	061066 97	061066 97	061066 97
	Date Sampled:		97/12/12	97/12/12	97/12/12	97/12/12	97/12/12
Component	**MDL**	**Units**		M. Spike	MS % Rec.	MS Dup	MSD % Rec.
Naphthalene	0.03	mg/kg	<	1.4	71	1.6	79
Acenaphthylene	0.04	"	<	1.4	69	1.7	85
Acenaphthene	0.07	"	<	1.5	75	1.7	87
Fluorene	0.03	"	<	1.5	77	1.8	88
Phenanthrene	0.03	"	<	1.6	77	1.7	85
Anthracene	0.03	"	<	1.7	86	1.8	92
Fluoranthene	0.02	"	<	1.8	92	1.9	97
Pyrene	0.03	"	<	1.8	88	1.8	91
Benz(a)anthracene	0.02	"	<	1.7	84	1.7	86
Chrysene	0.03	"	<	1.9	96	2.0	98
Benzo(b)fluoranthene	0.04	"	<	1.8	89	1.9	93
Benzo(k)fluoranthene	0.04	"	<	1.8	88	1.8	90
Benzo(a)pyrene	0.05	"	<	1.8	88	1.9	93
Indeno(1,2,3-cd)pyrene	0.06	"	<	1.7	84	1.8	90
Dibenzo(ah)anthracene	0.04	"	<	1.7	83	1.8	90
Benzo(ghi)perylene	0.04	"	<	1.9	93	2.0	100
Surrogate Recoveries		%					
d5-Nitrobenzene			66	64	64	74	74
2-Fluorobiphenyl			72	67	67	77	77
d14-p-Terphenyl			84	87	87	85	85

PASC - Certificate of Analysis

	Client ID:		MW-1-880	MW 10-880	MW-2-880	MW-2-880 DUP	MW-3-880
	Lab No.:		061067 97	061068 97	061069 97	061070 97	061071 97
	Date Sampled:		97/12/12	97/12/12	97/12/16	97/12/16	97/12/16
Component	**MDL**	**Units**					
Chloromethane	0.004	mg/kg	<	<	<	<	<
Vinyl Chloride	0.002	"	<	<	<	<	<
Bromomethane	0.005	"	<	<	<	<	<
Chloroethane	0.005	"	<	<	<	<	<
Trichlorofluoromethane	0.004	"	<	<	<	<	<
1,1-Dichloroethylene	0.005	"	<	<	<	<	<
Methylene chloride	0.010	"	<0.016	<	<0.22	<0.015	<0.017
trans-1,2-Dichloroethylene	0.003	"	<	<	<	<	<
1,1-Dichloroethane	0.002	"	<	<	<	<	<
cis-1,2-Dichloroethylene	0.003	"	<	<	<	<	<
Chloroform	0.002	"	<	<	<	<	<
1,1,1-Trichloroethane	0.003	"	<	<	<	<	<
1,2-Dichloroethane	0.003	"	<	<	<	<	<
Carbon tetrachloride	0.006	"	<	<	<	<	<
Benzene	0.001	"	<	<	<	0.009	0.005
1,2-Dichloropropane	0.003	"	<	<	<	<	<
Trichloroethylene	0.003	"	<	<	<	<	<
Bromodichloromethane	0.002	"	<	<	<	<	<
2-Chloroethylvinyl ether	0.004	"	<	<	<	<	<
cis-1,3-Dichloropropylene	0.002	"	<	<	<	<	<
trans-1,3-Dichloropropylene	0.004	"	<	<	<	<	<
Toluene	0.002	"	<	<	<	<	<
1,1,2-Trichloroethane	0.002	"	<	<	<	<	<
Chlorodibromomethane	0.004	"	<	<	<	<	<
Ethylene dibromide	0.006	"	<	<	<	<	<
Tetrachloroethylene	0.002	"	<	<	<	<	<
Chlorobenzene	0.003	"	<	<	<	<	<
Ethyl Benzene	0.002	"	<	<	<	<	<
m&p-Xylene	0.002	"	<	<	0.004	0.007	<
Bromoform	0.004	"	<	<	<	<	<
Styrene	0.002	"	<	<	<	<	<
o-Xylene	0.002	"	<	<	<	<	<
1,1,2,2-Tetrachloroethane	0.003	"	<	<	<	<	<
1,2-Dichlorobenzene	0.002	"	<	<	<	<	<
1,3-Dichlorobenzene	0.003	"	<	<	<	<	<
1,4-Dichlorobenzene	0.004	"	<	<	<	<	<
Surrogate Recoveries		%					
d4-1,2-Dichloroethane			86	89	86	85	84
d8-Toluene			99	103	97	98	99
Bromofluorobenzene			82	88	87	84	83

PASC - Certificate of Analysis

				MW		MW-2-880	
	Client ID:		MW-1-880	10-880	MW-2-880	DUP	MW-3-880
	Lab No.:		061067 97	061068 97	061069 97	061070 97	061071 97
	Date Sampled:		97/12/12	97/12/12	97/12/16	97/12/16	97/12/16
Component	**MDL**	**Units**					
Naphthalene	0.03	mg/kg	0.030	<	<	<	<
Acenaphthylene	0.04	"	<	<	<	<	<
Acenaphthene	0.07	"	<	<	<	<	<
Fluorene	0.03	"	<	<	<	<	<
Phenanthrene	0.03	"	0.27	<	<	<	<
Anthracene	0.03	"	0.04	<	<	<	<
Fluoranthene	0.02	"	0.45	<	<	<	<
Pyrene	0.03	"	0.37	<	<	<	<
Benz(a)anthracene	0.02	"	0.17	<	<	<	<
Chrysene	0.03	"	0.29	<	<	<	<
Benzo(b)fluoranthene	0.04	"	<0.41	<	<	<	<
Benzo(k)fluoranthene	0.04	"	<0.42	<	<	<	<
Benzo(a)pyrene	0.05	"	0.18	<	<	<	<
Indeno(1,2,3-cd)pyrene	0.06	"	0.17	<	<	<	<
Dibenzo(ah)anthracene	0.04	"	<	<	<	<	<
Benzo(ghi)perylene	0.04	"	0.17	<	<	<	<
Surrogate Recoveries		%					
d5-Nitrobenzene			60	56	62	58	64
2-Fluorobiphenyl			58	63	72	60	71
d14-p-Terphenyl			88	85	85	81	86

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				MW	MW		
	Client ID:		MW-5-880	12-880	11-880	MW-6-880	MW-8-880
	Lab No.:		061072 97	061073 97	061074 97	061075 97	061076 97
	Date Sampled:		97/12/16	97/12/17	97/12/17	97/12/17	97/12/17
Component	**MDL**	**Units**					
Chloromethane	0.004	mg/kg	<	<	<	<	<
Vinyl Chloride	0.002	"	<	<	<	<	<
Bromomethane	0.005	"	<	<	<	<	<
Chloroethane	0.005	"	<	<	<	<	<
Trichlorofluoromethane	0.004	"	<	<	<	<	<
1,1-Dichloroethylene	0.005	"	<	<	<	<	<
Methylene chloride	0.010	"	<0.013	<0.015	<	<	<0.022
trans-1,2-Dichloroethylene	0.003	"	<	<	<	<	<
1,1-Dichloroethane	0.002	"	<	<	<	<	<
cis-1,2-Dichloroethylene	0.003	"	<	<	<	<	<
Chloroform	0.002	"	<	<	<	<	<
1,1,1-Trichloroethane	0.003	"	<	<	<	<	<
1,2-Dichloroethane	0.003	"	<	<	<	<	<
Carbon tetrachloride	0.006	"	<	<	<	<	<
Benzene	0.001	"	<	<	<	<	<
1,2-Dichloropropane	0.003	"	<	<	<	<	<
Trichloroethylene	0.003	"	<	<	<	<	<
Bromodichloromethane	0.002	"	<	<	<	<	<
2-Chloroethylvinyl ether	0.004	"	<	<	<	<	<
cis-1,3-Dichloropropylene	0.002	"	<	<	<	<	<
trans-1,3-Dichloropropylene	0.004	"	<	<	<	<	<
Toluene	0.002	"	<	<	<	<	<
1,1,2-Trichloroethane	0.002	"	<	<	<	<	<
Chlorodibromomethane	0.004	"	<	<	<	<	<
Ethylene dibromide	0.006	"	<	<	<	<	<
Tetrachloroethylene	0.002	"	<	<	<	<	<
Chlorobenzene	0.003	"	<	<	<	<	<
Ethyl Benzene	0.002	"	<	<	<	<	<
m&p-Xylene	0.002	"	<	<	<	<	<
Bromoform	0.004	"	<	<	<	<	<
Styrene	0.002	"	<	<	<	<	<
o-Xylene	0.002	"	<	<	<	<	<
1,1,2,2-Tetrachloroethane	0.003	"	<	<	<	<	<
1,2-Dichlorobenzene	0.002	"	<	<	<	<	<
1,3-Dichlorobenzene	0.003	"	<	<	<	<	<
1,4-Dichlorobenzene	0.004	"	<	<	<	<	<
Surrogate Recoveries		%					
d4-1,2-Dichloroethane			89	83	84	83	86
d8-Toluene			108	92	93	97	94
Bromofluorobenzene			92	87	89	92	88

PASC - Certificate of Analysis

	Client ID:		MW-5-880	MW 12-880	MW 11-880	MW-6-880	MW-8-880
	Lab No.:		061072 97	061073 97	061074 97	061075 97	061076 97
	Date Sampled:		97/12/16	97/12/17	97/12/17	97/12/17	97/12/17
Component	**MDL**	**Units**					
Naphthalene	0.03	mg/kg	<	<	<	<	<
Acenaphthylene	0.04	"	<	<	<	<	<
Acenaphthene	0.07	"	<	<	<	<	<
Fluorene	0.03	"	<	<	<	<	<
Phenanthrene	0.03	"	<	<	<	<	0.04
Anthracene	0.03	"	<	<	<	<	<
Fluoranthene	0.02	"	<	<	<	<	0.07
Pyrene	0.03	"	<	<	<	<	0.06
Benz(a)anthracene	0.02	"	<	<	<	<	0.04
Chrysene	0.03	"	<	<	<	<	0.04
Benzo(b)fluoranthene	0.04	"	<	<	<	<	<0.05
Benzo(k)fluoranthene	0.04	"	<	<	<	<	<0.05
Benzo(a)pyrene	0.05	"	<	<	<	<	<
Indeno(1,2,3-cd)pyrene	0.06	"	<	<	<	<	<
Dibenzo(ah)anthracene	0.04	"	<	<	<	<	<
Benzo(ghi)perylene	0.04	"	<	<	<	<	<
Surrogate Recoveries		%					
d5-Nitrobenzene			62	65	67	53	45
2-Fluorobiphenyl			65	67	75	64	57
d14-p-Terphenyl			84	87	83	87	88

	Client ID:		MW-8-880 DUP	MW-8-880 DUP	MW-8-880 DUP	MW-8-880 DUP	MW-8-880 DUP
	Lab No.:		061077 97	061077 97	061077 97	061077 97	061077 97
	Date Sampled:		97/12/17	97/12/17	97/12/17	97/12/17	97/12/17
Component	**MDL**	**Units**		M. Spike	MS % Rec.	MS Dup	MSD % Rec.
Chloromethane	0.004	mg/kg	<	-	-	-	-
Vinyl Chloride	0.002	"	<	-	-	-	-
Bromomethane	0.005	"	<	-	-	-	-
Chloroethane	0.005	"	<	-	-	-	-
Trichlorofluoromethane	0.004	"	<	-	-	-	-
1,1-Dichloroethylene	0.005	"	<	-	-	-	-
Methylene chloride	0.010	"	<0.027	-	-	-	-
trans-1,2-Dichloroethylene	0.003	"	<	-	-	-	-
1,1-Dichloroethane	0.002	"	<	-	-	-	-
cis-1,2-Dichloroethylene	0.003	"	<	-	-	-	-
Chloroform	0.002	"	<	-	-	-	-
1,1,1-Trichloroethane	0.003	"	<	-	-	-	-
1,2-Dichloroethane	0.003	"	<	-	-	-	-
Carbon tetrachloride	0.006	"	<	-	-	-	-
Benzene	0.001	"	<	-	-	-	-
1,2-Dichloropropane	0.003	"	<	-	-	-	-
Trichloroethylene	0.003	"	<	-	-	-	-
Bromodichloromethane	0.002	"	<	-	-	-	-
2-Chloroethylvinyl ether	0.004	"	<	-	-	-	-
cis-1,3-Dichloropropylene	0.002	"	<	-	-	-	-
trans-1,3-Dichloropropylene	0.004	"	<	-	-	-	-
Toluene	0.002	"	<	-	-	-	-
1,1,2-Trichloroethane	0.002	"	<	-	-	-	-
Chlorodibromomethane	0.004	"	<	-	-	-	-
Ethylene dibromide	0.006	"	<	-	-	-	-
Tetrachloroethylene	0.002	"	<	-	-	-	-
Chlorobenzene	0.003	"	<	-	-	-	-
Ethyl Benzene	0.002	"	<	-	-	-	-
m&p-Xylene	0.002	"	<	-	-	-	-
Bromoform	0.004	"	<	-	-	-	-
Styrene	0.002	"	<	-	-	-	-
o-Xylene	0.002	"	<	-	-	-	-
1,1,2,2-Tetrachloroethane	0.003	"	<	-	-	-	-
1,2-Dichlorobenzene	0.002	"	<	-	-	-	-
1,3-Dichlorobenzene	0.003	"	<	-	-	-	-
1,4-Dichlorobenzene	0.004	"	<	-	-	-	-
Surrogate Recoveries		%					
d4-1,2-Dichloroethane			85	-	-	-	-
d8-Toluene			103	-	-	-	-
Bromofluorobenzene			91	-	-	-	-

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			MW-8-880 DUP	MW-8-880 DUP	MW-8-880 DUP	MW-8-880 DUP	MW-8-880 DUP
	Client ID:		DUP	DUP	DUP	DUP	DUP
	Lab No.:		061077 97	061077 97	061077 97	061077 97	061077 97
	Date Sampled:		97/12/17	97/12/17	97/12/17	97/12/17	97/12/17
Component	**MDL**	**Units**		M. Spike	MS % Rec.	MS Dup	MSD % Rec.
Naphthalene	0.03	mg/kg	0.28	1.8	63	1.6	54
Acenaphthylene	0.04	"	0.06	1.9	78	1.8	72
Acenaphthene	0.07	"	<	1.9	79	1.8	73
Fluorene	0.03	"	0.12	1.9	77	2.0	77
Phenanthrene	0.03	"	0.51	2.0	62	1.9	56
Anthracene	0.03	"	0.13	2.2	86	2.1	77
Fluoranthene	0.02	"	0.62	2.2	69	2.2	62
Pyrene	0.03	"	0.57	2.1	66	2.3	68
Benz(a)anthracene	0.02	"	0.28	1.9	70	2.0	70
Chrysene	0.03	"	0.35	2.3	81	2.4	81
Benzo(b)fluoranthene	0.04	"	<0.46	2.2	75	1.9	59
Benzo(k)fluoranthene	0.04	"	<0.46	2.0	66	2.4	79
Benzo(a)pyrene	0.05	"	0.23	2.1	80	2.2	79
Indeno(1,2,3-cd)pyrene	0.06	"	0.18	2.1	83	2.1	76
Dibenzo(ah)anthracene	0.04	"	<	2.0	86	2.0	80
Benzo(ghi)perylene	0.04	"	0.15	2.4	95	2.2	83
Surrogate Recoveries		%					
d5-Nitrobenzene			55	68	68	61	61
2-Fluorobiphenyl			78	80	80	74	74
d14-p-Terphenyl			94	86	86	88	88

PHILIP SERVICES

Certificate of Analysis

CLIENT INFORMATION

Attention:	Jim Barrett
Client Name:	Golder Associates
Project:	973-6825
Project Desc:	
Address:	400 Commercial Street Manchester, New Hampshire 3101
Fax Number:	603-668-1199
Phone Number:	603-668-0880

LABORATORY INFORMATION

Contact:	M. Johnson, B.A., B.Sc.
Project:	AN971285
Date Received:	98/04/10
Date Reported:	98/04/29
Submission No.:	8D0291
Sample No.:	015445-015462

NOTES: *"-' = not analysed '<' = less than Method Detection Limit (MDL) 'NA' = no data available*
LOQ can by determined for all analytes by multiplying the appropriate MDL X 3.33
Solids data is based on dry weight except for biota analyses.
Organic analyses are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)

Methods used by PASC are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Seventeenth Edition. Other methods are based on the principles of MISA or EPA methodologies. New York State: ELAP Identification Number 10756.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at PASC for a period of three weeks from receipt of data or as per contract.

COMMENTS:

Certified by: _____

PHILIP ANALYTICAL SERVICES CORPORATION
5555 North Service Road, Burlington, Ontario, Canada L7L 5H7 Tel: (905) 332-0778 Fax: (905) 332-9169

	Client ID:		Method Blank	Method Blank	Method Blank	909-MW7	908-MW6
	Lab No.:		015445 98	015445 98	015445 98	015446 98	015447 98
	Date Sampled:		98/04/08	98/04/08	98/04/08	98/04/08	98/04/08
Component	**MDL**	**Units**		M. Spike	MS % Rec.		
Chloromethane	1.0	ug/L	<	52	100	<	<
Vinyl Chloride	0.7	"	<	53	110	<	<
Bromomethane	0.6	"	<	50	99	<	<
Chloroethane	1.0	"	<	53	110	<	<
Trichlorofluoromethane	1.8	"	<	44	87	<	<
1,1-Dichloroethylene	0.6	"	<	51	100	<	<
Methylene chloride	0.7	"	<	50	100	<	<
trans-1,2-Dichloroethylene	1.6	"	<	48	96	<	<
1,1-Dichloroethane	0.5	"	<	49	98	<	<
cis-1,2-Dichloroethylene	0.6	"	<	49	98	<	<
Chloroform	0.4	"	<	48	96	<	<
1,1,1-Trichloroethane	0.3	"	<	53	110	<	<
1,2-Dichloroethane	0.7	"	<	50	99	<	<
Carbon tetrachloride	0.3	"	<	54	110	<	<
Benzene	0.3	"	<	50	100	<	4.0
1,2-Dichloropropane	0.5	"	<	50	100	<	<
Trichloroethylene	0.3	"	<	53	110	<	<
Bromodichloromethane	0.5	"	<	53	110	<	<
2-Chloroethylvinyl ether	1.5	"	<	46	93	<	<
cis-1,3-Dichloropropylene	1.0	"	<	49	97	<	<
trans-1,3-Dichloropropylene	1.0	"	<	46	91	<	<
Toluene	0.4	"	<	50	99	<	<
1,1,2-Trichloroethane	0.4	"	<	51	100	<	<
Chlorodibromomethane	0.6	"	<	56	110	<	<
Ethylene Dibromide	0.4	"	<	52	100	<	<
Tetrachloroethylene	0.4	"	<	53	110	<	<
Chlorobenzene	0.3	"	<	50	99	<	<
Ethylbenzene	0.3	"	<	51	100	<	4.5
m&p-Xylene	0.8	"	<	100	100	<	5.1
Bromoform	0.5	"	<	55	110	<	<
Styrene	0.4	"	<	37	73	<	<
o-Xylene	0.4	"	<	52	100	<	5.2
1,1,2,2-Tetrachloroethane	0.6	"	<	50	99	<	<
1,2-Dichlorobenzene	0.3	"	<	54	110	<	<
1,3-Dichlorobenzene	0.4	"	<	53	110	<	<
1,4-Dichlorobenzene	0.4	"	<	52	100	<	<
Surrogate Recoveries		%					
d4-Dichloroethane			93	95	95	89	87
d8-Toluene			97	96	96	94	95
Bromofluorobenzene			98	108	108	99	97
pH			7.00	-	-	2.00	2.00

			Method	Method	Method		
	Client ID:		Blank	Blank	Blank	909-MW7	908-MW6
	Lab No.:		015445 98	015445 98	015445 98	015446 98	015447 98
	Date Sampled:		98/04/08	98/04/08	98/04/08	98/04/08	98/04/08
Component	**MDL**	**Units**		M. Spike	MS % Rec.		
Naphthalene	0.3	ug/L	<	17	86	<	<
Acenaphthylene	0.4	"	<	17	83	<	<
Acenaphthene	0.7	"	<	19	94	<	<
Fluorene	0.3	"	<	19	96	<	<
Phenanthrene	0.3	"	<	21	100	<	<
Anthracene	0.3	"	<	20	100	<	<
Fluoranthene	0.2	"	<	22	110	<	<
Pyrene	0.3	"	<	22	110	<	<
Benz(a)anthracene	0.2	"	<	23	110	<	<
Chrysene	0.3	"	<	23	120	<	<
Benzo(b)fluoranthene	0.4	"	<	22	110	<	<
Benzo(k)fluoranthene	0.4	"	<	23	120	<	<
Benzo(a)pyrene	0.5	"	<	23	110	<	<
Indeno(1,2,3-cd)pyrene	0.6	"	<	21	110	<	<
Dibenzo(ah)anthracene	0.4	"	<	22	110	<	<
Benzo(ghi)perylene	0.4	"	<	22	110	<	<
Surrogate Recoveries		%					
d5-Nitrobenzene			68	84	84	77	87
2-Fluorobiphenyl			73	84	84	82	86
d14-p-Terphenyl			103	98	98	108	110

	Client ID:		908-MW11	908-TB	880-MW1	880-MW3	880-MW2
	Lab No.:		015448 98	015449 98	015450 98	015451 98	015452 98
	Date Sampled:		98/04/08	98/04/08	98/04/08	98/04/08	98/04/08
Component	**MDL**	**Units**					
Chloromethane	1.0	ug/L	<	<	<	<	<
Vinyl Chloride	0.7	"	<	<	<	<	<
Bromomethane	0.6	"	<	<	<	<	<
Chloroethane	1.0	"	<	<	<	<	<
Trichlorofluoromethane	1.8	"	<	<	<	<	<
1,1-Dichloroethylene	0.6	"	<	<	<	<	<
Methylene chloride	0.7	"	<	<	<	<	<
trans-1,2-Dichloroethylene	1.6	"	<	<	<	<	<
1,1-Dichloroethane	0.5	"	<	<	<	<	<
cis-1,2-Dichloroethylene	0.6	"	<	<	<	<	<
Chloroform	0.4	"	<	<	<	<	<
1,1,1-Trichloroethane	0.3	"	<	<	<	<	<
1,2-Dichloroethane	0.7	"	<	<	<	<	<
Carbon tetrachloride	0.3	"	<	<	<	<	<
Benzene	0.3	"	<	<	<	<	<
1,2-Dichloropropane	0.5	"	<	<	<	<	<
Trichloroethylene	0.3	"	<	<	<	<	<
Bromodichloromethane	0.5	"	<	<	<	<	<
2-Chloroethylvinyl ether	1.5	"	<	<	<	<	<
cis-1,3-Dichloropropylene	1.0	"	<	<	<	<	<
trans-1,3-Dichloropropylene	1.0	"	<	<	<	<	<
Toluene	0.4	"	<	<	<	<	<
1,1,2-Trichloroethane	0.4	"	<	<	<	<	<
Chlorodibromomethane	0.6	"	<	<	<	<	<
Ethylene Dibromide	0.4	"	<	<	<	<	<
Tetrachloroethylene	0.4	"	<	<	<	<	<
Chlorobenzene	0.3	"	<	<	<	<	<
Ethylbenzene	0.3	"	<	<	<	<	<
m&p-Xylene	0.8	"	<	<	<	<	2.2
Bromoform	0.5	"	<	<	<	<	<
Styrene	0.4	"	<	<	<	<	<
o-Xylene	0.4	"	<	<	<	<	<
1,1,2,2-Tetrachloroethane	0.6	"	<	<	<	<	<
1,2-Dichlorobenzene	0.3	"	<	<	<	<	<
1,3-Dichlorobenzene	0.4	"	<	<	<	<	<
1,4-Dichlorobenzene	0.4	"	<	<	<	<	<
Surrogate Recoveries		%					
d4-Dichloroethane			84	84	88	86	87
d8-Toluene			90	96	100	95	88
Bromofluorobenzene			93	89	97	98	90
pH			2.00	2.00	2.00	2.00	2.00

	Client ID:		908-MW11	908-TB	880-MW1	880-MW3	880-MW2
	Lab No.:		015448 98	015449 98	015450 98	015451 98	015452 98
	Date Sampled:		98/04/08	98/04/08	98/04/08	98/04/08	98/04/08
Component	**MDL**	**Units**					
Naphthalene	0.3	ug/L	<	-	<	<	<
Acenaphthylene	0.4	"	<	-	<	<	<
Acenaphthene	0.7	"	<	-	<	<	<
Fluorene	0.3	"	<	-	<	<	<
Phenanthrene	0.3	"	<	-	<	<	<
Anthracene	0.3	"	<	-	<	<	<
Fluoranthene	0.2	"	<	-	<	<	<
Pyrene	0.3	"	<	-	<	<	<
Benz(a)anthracene	0.2	"	<	-	<	<	<
Chrysene	0.3	"	<	-	<	<	<
Benzo(b)fluoranthene	0.4	"	<	-	<	<	<
Benzo(k)fluoranthene	0.4	"	<	-	<	<	<
Benzo(a)pyrene	0.5	"	<	-	<	<	<
Indeno(1,2,3-cd)pyrene	0.6	"	<	-	<	<	<
Dibenzo(ah)anthracene	0.4	"	<	-	<	<	<
Benzo(ghi)perylene	0.4	"	<	-	<	<	<
Surrogate Recoveries		%					
d5-Nitrobenzene			81	-	89	91	69
2-Fluorobiphenyl			81	-	90	91	73
d14-p-Terphenyl			105	-	104	114	110

	Client ID:		880-MW5	880-MW7	880-MW8	880-MW9	880-MW10
	Lab No.:		015453 98	015454 98	015455 98	015456 98	015457 98
	Date Sampled:		98/04/08	98/04/09	98/04/09	98/04/09	98/04/09
Component	**MDL**	**Units**					
Chloromethane	1.0	ug/L	<	<	<	<	<
Vinyl Chloride	0.7	"	<	<	<	<	<
Bromomethane	0.6	"	<	<	<	<	<
Chloroethane	1.0	"	<	<	<	<	<
Trichlorofluoromethane	1.8	"	<	<	<	<	<
1,1-Dichloroethylene	0.6	"	<	<	<	<	<
Methylene chloride	0.7	"	<	1.3	2.7	<	1.4
trans-1,2-Dichloroethylene	1.6	"	<	<	<	<	<
1,1-Dichloroethane	0.5	"	<	<	<	<	<
cis-1,2-Dichloroethylene	0.6	"	<	<	<	<	<
Chloroform	0.4	"	<	<	<	<	<
1,1,1-Trichloroethane	0.3	"	<	<	<	<	<
1,2-Dichloroethane	0.7	"	<	<	<	<	<
Carbon tetrachloride	0.3	"	<	<	<	<	<
Benzene	0.3	"	<	3.2	<	1.3	<
1,2-Dichloropropane	0.5	"	<	<	<	<	<
Trichloroethylene	0.3	"	<	<	<	<	<
Bromodichloromethane	0.5	"	<	<	<	3.5	<
2-Chloroethylvinyl ether	1.5	"	<	<	<	<	<
cis-1,3-Dichloropropylene	1.0	"	<	<	<	<	<
trans-1,3-Dichloropropylene	1.0	"	<	<	<	<	<
Toluene	0.4	"	<	0.7	<	<	<
1,1,2-Trichloroethane	0.4	"	<	<	<	5.8	<
Chlorodibromomethane	0.6	"	<	<	<	<	<
Ethylene Dibromide	0.4	"	<	<	<	<	<
Tetrachloroethylene	0.4	"	<	<	<	<	<
Chlorobenzene	0.3	"	<	<	<	<	<
Ethylbenzene	0.3	"	<	1.4	<	77	<
m&p-Xylene	0.8	"	<	3.2	<	41	<
Bromoform	0.5	"	<	<	<	<	<
Styrene	0.4	"	<	<	<	<	<
o-Xylene	0.4	"	<	1.1	<	1.9	<
1,1,2,2-Tetrachloroethane	0.6	"	<	<	<	<	<
1,2-Dichlorobenzene	0.3	"	<	<	<	<	<
1,3-Dichlorobenzene	0.4	"	<	<	<	<	<
1,4-Dichlorobenzene	0.4	"	<	<	<	<	<
Surrogate Recoveries		%					
d4-Dichloroethane			82	94	88	86	89
d8-Toluene			94	97	96	96	101
Bromofluorobenzene			98	95	91	91	90
pH			2.00	2.00	2.00	2.00	2.00

	Client ID:		880-MW5	880-MW7	880-MW8	880-MW9	880-MW10
	Lab No.:		015453 98	015454 98	015455 98	015456 98	015457 98
	Date Sampled:		98/04/08	98/04/09	98/04/09	98/04/09	98/04/09
Component	**MDL**	**Units**					
Naphthalene	0.3	ug/L	<	<	<	61	<
Acenaphthylene	0.4	"	<	<	<	<	<
Acenaphthene	0.7	"	<	<	<	4.0	<
Fluorene	0.3	"	<	<	<	11	<
Phenanthrene	0.3	"	<	<	<	15	<
Anthracene	0.3	"	<	<	<	<	<
Fluoranthene	0.2	"	<	<	0.4	0.4	<
Pyrene	0.3	"	<	<	0.5	1.2	<
Benz(a)anthracene	0.2	"	<	<	0.5	<	<
Chrysene	0.3	"	<	<	0.4	<	<
Benzo(b)fluoranthene	0.4	"	<	<	<	<	<
Benzo(k)fluoranthene	0.4	"	<	<	<	<	<
Benzo(a)pyrene	0.5	"	<	<	<	<	<
Indeno(1,2,3-cd)pyrene	0.6	"	<	<	<	<	<
Dibenzo(ah)anthracene	0.4	"	<	<	<	<	<
Benzo(ghi)perylene	0.4	"	<	<	<	<	<
Surrogate Recoveries		%					
d5-Nitrobenzene			89	89	92	100	79
2-Fluorobiphenyl			90	91	89	102	81
d14-p-Terphenyl			107	108	116	77	109

	Client ID:		880-MW12	910-MW1	910-MW2	910-MW2	910-MW2
	Lab No.:		015458 98	015459 98	015460 98	015460 98	015460 98
	Date Sampled:		98/04/09	98/04/09	98/04/09	98/04/09	98/04/09
Component	**MDL**	**Units**				M. Spike	MS % Rec.
Chloromethane	1.0	ug/L	<	<	<	42	84
Vinyl Chloride	0.7	"	<	<	<	43	87
Bromomethane	0.6	"	<	<	<	39	79
Chloroethane	1.0	"	<	<	<	43	86
Trichlorofluoromethane	1.8	"	<	<	<	36	72
1,1-Dichloroethylene	0.6	"	<	<	<	41	82
Methylene chloride	0.7	"	1.3	1.7	2.0	43	86
trans-1,2-Dichloroethylene	1.6	"	<	<	<	40	91
1,1-Dichloroethane	0.5	"	<	<	<	43	85
cis-1,2-Dichloroethylene	0.6	"	<	<	<	41	82
Chloroform	0.4	"	<	<	<	42	83
1,1,1-Trichloroethane	0.3	"	<	<	<	47	94
1,2-Dichloroethane	0.7	"	<	<	<	41	83
Carbon tetrachloride	0.3	"	<	<	<	47	93
Benzene	0.3	"	<	<	<	45	89
1,2-Dichloropropane	0.5	"	<	<	<	45	91
Trichloroethylene	0.3	"	<	<	<	44	88
Bromodichloromethane	0.5	"	<	<	<	48	96
2-Chloroethylvinyl ether	1.5	"	<	<	<	<	<
cis-1,3-Dichloropropylene	1.0	"	<	<	<	42	84
trans-1,3-Dichloropropylene	1.0	"	<	<	<	42	83
Toluene	0.4	"	<	<	<	41	82
1,1,2-Trichloroethane	0.4	"	<	<	<	46	92
Chlorodibromomethane	0.6	"	<	<	<	51	100
Ethylene Dibromide	0.4	"	<	<	<	46	91
Tetrachloroethylene	0.4	"	<	<	<	39	79
Chlorobenzene	0.3	"	<	<	<	40	79
Ethylbenzene	0.3	"	<	<	<	40	80
m&p-Xylene	0.8	"	<	<	<	75	76
Bromoform	0.5	"	<	<	<	49	98
Styrene	0.4	"	<	<	<	42	84
o-Xylene	0.4	"	<	<	<	41	81
1,1,2,2-Tetrachloroethane	0.6	"	<	<	<	41	83
1,2-Dichlorobenzene	0.3	"	<	<	<	41	82
1,3-Dichlorobenzene	0.4	"	<	<	<	34	68
1,4-Dichlorobenzene	0.4	"	<	<	<	35	70
Surrogate Recoveries		%					
d4-Dichloroethane			92	96	90	95	95
d8-Toluene			101	106	98	98	98
Bromofluorobenzene			92	90	83	93	93
pH			2.00	2.00	2.00	-	-

	Client ID:		880-MW12	910-MW1	910-MW2	910-MW2	910-MW2
	Lab No.:		015458 98	015459 98	015460 98	015460 98	015460 98
	Date Sampled:		98/04/09	98/04/09	98/04/09	98/04/09	98/04/09
Component	**MDL**	**Units**				M. Spike	MS % Rec.
Naphthalene	0.3	ug/L	<	<	<	-	-
Acenaphthylene	0.4	"	<	<	<	-	-
Acenaphthene	0.7	"	<	<	<	-	-
Fluorene	0.3	"	<	<	<	-	-
Phenanthrene	0.3	"	<	<	<	-	-
Anthracene	0.3	"	<	<	<	-	-
Fluoranthene	0.2	"	<	<	<	-	-
Pyrene	0.3	"	<	<	<	-	-
Benz(a)anthracene	0.2	"	<	<	<	-	-
Chrysene	0.3	"	<	<	<	-	-
Benzo(b)fluoranthene	0.4	"	<	<	<	-	-
Benzo(k)fluoranthene	0.4	"	<	<	<	-	-
Benzo(a)pyrene	0.5	"	<	<	<	-	-
Indeno(1,2,3-cd)pyrene	0.6	"	<	<	<	-	-
Dibenzo(ah)anthracene	0.4	"	<	<	<	-	-
Benzo(ghi)perylene	0.4	"	<	<	<	-	-
Surrogate Recoveries		%					
d5-Nitrobenzene			84	90	83	-	-
2-Fluorobiphenyl			92	92	85	-	-
d14-p-Terphenyl			114	110	110	-	-

	Client ID:		910-MW2	910-MW2	910-MW3	910-Trip Blank
	Lab No.:		015460 98	015460 98	015461 98	015462 98
	Date Sampled:		98/04/09	98/04/09	98/04/09	98/04/09
Component	**MDL**	**Units**	MS Dup	MSD % Rec.		
Chloromethane	1.0	ug/L	47	94	<	<
Vinyl Chloride	0.7	"	48	96	<	<
Bromomethane	0.6	"	48	96	<	<
Chloroethane	1.0	"	53	110	<	<
Trichlorofluoromethane	1.8	"	41	82	<	<
1,1-Dichloroethylene	0.6	"	48	95	<	<
Methylene chloride	0.7	"	47	94	3.8	<
trans-1,2-Dichloroethylene	1.6	"	48	95	<	<
1,1-Dichloroethane	0.5	"	47	94	<	<
cis-1,2-Dichloroethylene	0.6	"	48	95	<	<
Chloroform	0.4	"	48	95	<	<
1,1,1-Trichloroethane	0.3	"	56	110	<	<
1,2-Dichloroethane	0.7	"	47	94	<	<
Carbon tetrachloride	0.3	"	60	120	<	<
Benzene	0.3	"	55	110	<	<
1,2-Dichloropropane	0.5	"	52	100	<	<
Trichloroethylene	0.3	"	60	120	<	<
Bromodichloromethane	0.5	"	57	110	<	<
2-Chloroethylvinyl ether	1.5	"	<	<	<	<
cis-1,3-Dichloropropylene	1.0	"	54	110	<	<
trans-1,3-Dichloropropylene	1.0	"	52	100	<	<
Toluene	0.4	"	52	100	<	<
1,1,2-Trichloroethane	0.4	"	55	110	<	<
Chlorodibromomethane	0.6	"	63	130	<	<
Ethylene Dibromide	0.4	"	54	110	<	<
Tetrachloroethylene	0.4	"	58	120	<	<
Chlorobenzene	0.3	"	53	110	<	<
Ethylbenzene	0.3	"	55	110	<	<
m&p-Xylene	0.8	"	100	100	<	<
Bromoform	0.5	"	61	120	<	<
Styrene	0.4	"	55	110	<	<
o-Xylene	0.4	"	53	110	<	<
1,1,2,2-Tetrachloroethane	0.6	"	49	99	<	<
1,2-Dichlorobenzene	0.3	"	56	110	<	<
1,3-Dichlorobenzene	0.4	"	53	110	<	<
1,4-Dichlorobenzene	0.4	"	55	110	<	<
Surrogate Recoveries		%				
d4-Dichloroethane			89	89	89	89
d8-Toluene			95	95	92	98
Bromofluorobenzene			104	104	95	92
pH			-	-	2.00	2.00

	Client ID:		910-MW2	910-MW2	910-MW3	910-Trip Blank
	Lab No.:		015460 98	015460 98	015461 98	015462 98
	Date Sampled:		98/04/09	98/04/09	98/04/09	98/04/09
Component	**MDL**	**Units**	MS Dup	MSD % Rec.		
Naphthalene	0.3	ug/L	-	-	<	-
Acenaphthylene	0.4	"	-	-	<	-
Acenaphthene	0.7	"	-	-	<	-
Fluorene	0.3	"	-	-	<	-
Phenanthrene	0.3	"	-	-	<	-
Anthracene	0.3	"	-	-	<	-
Fluoranthene	0.2	"	-	-	<	-
Pyrene	0.3	"	-	-	<	-
Benz(a)anthracene	0.2	"	-	-	<	-
Chrysene	0.3	"	-	-	<	-
Benzo(b)fluoranthene	0.4	"	-	-	<	-
Benzo(k)fluoranthene	0.4	"	-	-	<	-
Benzo(a)pyrene	0.5	"	-	-	<	-
Indeno(1,2,3-cd)pyrene	0.6	"	-	-	<	-
Dibenzo(ah)anthracene	0.4	"	-	-	<	-
Benzo(ghi)perylene	0.4	"	-	-	<	-
Surrogate Recoveries		%				
d5-Nitrobenzene			-	-	70	-
2-Fluorobiphenyl			-	-	69	-
d14-p-Terphenyl			-	-	104	-

PHILIP SERVICES

Certificate of Analysis

CLIENT INFORMATION

Attention:	Jim Barrett
Client Name:	Golder Associates
Project:	973-6825
Project Desc:	
Address:	400 Commercial Street Manchester, New Hampshire 3101
Fax Number:	603-668-1199
Phone Number:	603-668-0880

LABORATORY INFORMATION

Contact:	Dave Howell
Project:	AN971285
Date Received:	98/05/01
Date Reported:	98/05/12
Submission No.:	8E0039
Sample No.:	019011-019014

NOTES: *'-' = not analysed '<' = less than Method Detection Limit (MDL) 'NA' = no data available*
LOQ can by determined for all analytes by multiplying the appropriate MDL X 3.33
Solids data is based on dry weight except for biota analyses.
Organic analyses are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)

Methods used by PASC are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Seventeenth Edition. Other methods are based on the principles of MISA or EPA methodologies. New York State: ELAP Identification Number 10756.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at PASC for a period of three weeks from receipt of data or as per contract.

COMMENTS:

Certified by:

PHILIP ANALYTICAL SERVICES CORPORATION
5555 North Service Road, Burlington, Ontario, Canada L7L 5H7 Tel: (905) 332-8788 Fax: (905) 332-9169

	Client ID:		Method Blank	Method Blank	Method Blank	Method Blank	Method Blank
	Lab No.:		019011 98	019011 98	019011 98	019011 98	019011 98
	Date Sampled:		98/04/30	98/04/30	98/04/30	98/04/30	98/04/30
Component	**MDL**	**Units**		Duplicate	M. Spike	MS % Rec.	MS Dup
Chloromethane	0.004	mg/kg	<	NA	0.23	91	-
Vinyl Chloride	0.002	"	<	NA	0.22	89	-
Bromomethane	0.005	"	<	NA	0.28	110	-
Chloroethane	0.005	"	<	NA	0.27	110	-
Trichlorofluoromethane	0.004	"	<	NA	0.22	87	-
1,1-Dichloroethylene	0.005	"	<	NA	0.22	80	-
Methylene chloride	0.010	"	0.012	NA	0.23	94	-
trans-1,2-Dichloroethylene	0.003	"	<	NA	0.22	86	-
1,1-Dichloroethane	0.002	"	<	NA	0.22	88	-
cis-1,2-Dichloroethylene	0.003	"	<	NA	0.21	86	-
Chloroform	0.002	"	<	NA	0.21	85	-
1,1,1-Trichloroethane	0.003	"	<	NA	0.21	84	-
1,2-Dichloroethane	0.003	"	<	NA	0.20	80	-
Carbon tetrachloride	0.006	"	<	NA	0.22	90	-
Benzene	0.001	"	<	NA	0.21	85	-
1,2-Dichloropropane	0.003	"	<	NA	0.21	84	-
Trichloroethylene	0.003	"	<	NA	0.22	89	-
Bromodichloromethane	0.002	"	<	NA	0.22	87	-
2-Chloroethylvinyl ether	0.004	"	<	NA	0.22	86	-
cis-1,3-Dichloropropylene	0.002	"	<	NA	0.21	82	-
trans-1,3-Dichloropropylene	0.004	"	<	NA	0.21	83	-
Toluene	0.002	"	<	NA	0.21	86	-
1,1,2-Trichloroethane	0.002	"	<	NA	0.22	88	-
Chlorodibromomethane	0.004	"	<	NA	0.24	94	-
Ethylene dibromide	0.006	"	<	NA	0.22	88	-
Tetrachloroethylene	0.002	"	<	NA	0.23	93	-
Chlorobenzene	0.003	"	<	NA	0.22	85	-
Ethyl Benzene	0.002	"	<	NA	0.21	84	-
m&p-Xylene	0.002	"	<	NA	0.42	94	-
Bromoform	0.004	"	<	NA	0.25	100	-
Styrene	0.002	"	<	NA	0.22	87	-
o-Xylene	0.002	"	<	NA	0.21	85	-
1,1,2,2-Tetrachloroethane	0.003	"	<	NA	0.23	90	-
1,2-Dichlorobenzene	0.002	"	<	NA	0.23	93	-
1,3-Dichlorobenzene	0.003	"	<	NA	0.22	89	-
1,4-Dichlorobenzene	0.004	"	<	NA	0.23	92	-
Surrogate Recoveries		%					
d4-1,2-Dichloroethane			89	NA	93	93	-
d8-Toluene			97	NA	99	99	-
Bromofluorobenzene			92	NA	97	97	-
Naphthalene	0.03	mg/kg	<	NA	1.5	76	1.5

	Client ID:		Method Blank	Method Blank	Method Blank	Method Blank	Method Blank
	Lab No.:		019011 98	019011 98	019011 98	019011 98	019011 98
	Date Sampled:		98/04/30	98/04/30	98/04/30	98/04/30	98/04/30
Component	**MDL**	**Units**		Duplicate	M. Spike	MS % Rec.	MS Dup
Acenaphthylene	0.04	"	<	NA	1.5	74	1.5
Acenaphthene	0.07	"	<	NA	1.5	76	1.5
Fluorene	0.03	"	<	NA	1.5	73	1.5
Phenanthrene	0.03	"	<	NA	1.5	77	1.6
Anthracene	0.03	"	<	NA	1.5	75	1.5
Fluoranthene	0.02	"	<	NA	1.5	75	1.6
Pyrene	0.03	"	<	NA	1.7	83	1.6
Benz(a)anthracene	0.02	"	<	NA	1.6	82	1.7
Chrysene	0.03	"	<	NA	1.7	85	1.8
Benzo(b)fluoranthene	0.04	"	<	NA	1.6	80	1.7
Benzo(k)fluoranthene	0.04	"	<	NA	1.8	89	1.8
Benzo(a)pyrene	0.05	"	<	NA	1.6	82	1.7
Indeno(1,2,3-cd)pyrene	0.06	"	<	NA	1.7	86	1.6
Dibenzo(ah)anthracene	0.04	"	<	NA	1.7	85	1.5
Benzo(ghi)perylene	0.04	"	<	NA	1.9	95	1.7
Surrogate Recoveries		%					
d5-Nitrobenzene			62	NA	76	76	74
2-Fluorobiphenyl			76	NA	81	81	81
d14-p-Terphenyl			82	NA	92	92	82

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			Method Blank	909-SS1	909-SS2	909-SS3
Client ID:						
Lab No.:			019011 98	019012 98	019013 98	019014 98
Date Sampled:			98/04/30	98/04/30	98/04/30	98/04/30
Component	**MDL**	**Units**	MSD % Rec.			
Chloromethane	0.004	mg/kg	-	<0.10	<	<
Vinyl Chloride	0.002	"	-	<0.050	<	<
Bromomethane	0.005	"	-	<0.13	<	<
Chloroethane	0.005	"	-	<0.13	<	<
Trichlorofluoromethane	0.004	"	-	<0.10	<	<
1,1-Dichloroethylene	0.005	"	-	<0.13	<	<
Methylene chloride	0.010	"	-	0.56	0.013	<
trans-1,2-Dichloroethylene	0.003	"	-	<0.075	<	<
1,1-Dichloroethane	0.002	"	-	<0.050	<	<
cis-1,2-Dichloroethylene	0.003	"	-	<0.075	<	<
Chloroform	0.002	"	-	<0.050	<	<
1,1,1-Trichloroethane	0.003	"	-	<0.075	<	<
1,2-Dichloroethane	0.003	"	-	<0.075	<	<
Carbon tetrachloride	0.006	"	-	<0.15	<	<
Benzene	0.001	"	-	<0.025	<	<
1,2-Dichloropropane	0.003	"	-	<0.075	<	<
Trichloroethylene	0.003	"	-	<0.075	<	<
Bromodichloromethane	0.002	"	-	<0.050	<	<
2-Chloroethylvinyl ether	0.004	"	-	<0.10	<	<
cis-1,3-Dichloropropylene	0.002	"	-	<0.050	<	<
trans-1,3-Dichloropropylene	0.004	"	-	<0.10	<	<
Toluene	0.002	"	-	<0.050	<	<
1,1,2-Trichloroethane	0.002	"	-	<0.050	<	<
Chlorodibromomethane	0.004	"	-	<0.10	<	<
Ethylene dibromide	0.006	"	-	<0.15	<	<
Tetrachloroethylene	0.002	"	-	<0.050	<	<
Chlorobenzene	0.003	"	-	<0.075	<	<
Ethyl Benzene	0.002	"	-	<0.050	<	<
m&p-Xylene	0.002	"	-	<0.050	<	<
Bromoform	0.004	"	-	<0.10	<	<
Styrene	0.002	"	-	<0.050	<	<
o-Xylene	0.002	"	-	<0.050	<	<
1,1,2,2-Tetrachloroethane	0.003	"	-	<0.075	<	<
1,2-Dichlorobenzene	0.002	"	-	<0.050	<	<
1,3-Dichlorobenzene	0.003	"	-	<0.075	<	<
1,4-Dichlorobenzene	0.004	"	-	<0.10	<	<
Surrogate Recoveries		%				
d4-1,2-Dichloroethane			-	89	83	84
d8-Toluene			-	106	103	96
Bromofluorobenzene			-	91	85	83
Naphthalene	0.03	mg/kg	75	<0.60	0.67	0.32

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			Method			
	Client ID:		Blank	909-SS1	909-SS2	909-SS3
	Lab No.:		019011 98	019012 98	019013 98	019014 98
	Date Sampled:		98/04/30	98/04/30	98/04/30	98/04/30
Component	**MDL**	**Units**	MSD % Rec.			
Acenaphthylene	0.04	"	76	<0.80	0.14	0.11
Acenaphthene	0.07	"	76	<1.4	<	0.09
Fluorene	0.03	"	76	<0.60	0.10	0.06
Phenanthrene	0.03	"	81	<0.60	1.4	2.8
Anthracene	0.03	"	77	<0.60	0.18	0.14
Fluoranthene	0.02	"	81	<0.40	2.2	4.4
Pyrene	0.03	"	80	22	2.2	4.7
Benz(a)anthracene	0.02	"	85	<0.40	1.1	1.1
Chrysene	0.03	"	88	2.1	1.7	3.0
Benzo(b)fluoranthene	0.04	"	84	<0.80	1.7	3.8
Benzo(k)fluoranthene	0.04	"	89	<0.80	1.4	2.4
Benzo(a)pyrene	0.05	"	84	<1.0	1.3	2.4
Indeno(1,2,3-cd)pyrene	0.06	"	78	<1.2	1.4	2.1
Dibenzo(ah)anthracene	0.04	"	75	<0.80	0.34	0.49
Benzo(ghi)perylene	0.04	"	83	<0.80	1.3	1.9
Surrogate Recoveries		%				
d5-Nitrobenzene			74	58	66	70
2-Fluorobiphenyl			81	55	78	80
d14-p-Terphenyl			82	62	93	116

019011 98 8260V1-S O4MC03_V 4050503.D
019011 98 82PAH-S OBYD10_S B050710.D
019011 98 8260V2-S O4MC03_V 4050503.D
019012 98 8260V1-S O4MB30_V 4050130.D
019012 98 8260V2-S O4MB30_V 4050130.D
019012 98 82PAH-S OBYE04_S B050804.D
019013 98 82PAH-S OBYE11_S B050811.D
019013 98 8260V1-S O4MC07_V 4050507.D
019013 98 8260V2-S O4MC07_V 4050507.D
019014 98 82PAH-S OBYE12_S B050812.D
019014 98 8260V2-S O4MC08_V 4050508.D
019014 98 8260V1-S O4MC08_V 4050508.D

SAMPLE NOTEPAD SUMMARY

ZN
--

019011 98
lbrecv:LLNONOTEPDNo Notepad Present
019012 98
MS and MSD were run but not reportable due
to matrix interferences.

Posted by JZVONAR on 11:48:08 98/05/11
This extract was run a number of times at 2mL FV and it shut
down the MSD. It was diluted a further 1:10 and re-run and
the data in LIMS is from this dilution.

Posted by KNICOL on 17:44:11 98/05/11

019013 98
lbrecv:LLNONOTEPDNo Notepad Present
019014 98
lbrecv:LLNONOTEPDNo Notepad Present
019015 98
lbrecv:LLNONOTEPDNo Notepad Present
019016 98
lbrecv:LLNONOTEPDNo Notepad Present
019017 98
lbrecv:LLNONOTEPDNo Notepad Present
019018 98
lbrecv:LLNONOTEPDNo Notepad Present
019019 98
lbrecv:LLNONOTEPDNo Notepad Present
019020 98
lbrecv:LLNONOTEPDNo Notepad Present

T2 TEST RESULTS SUMMARY

PHILIP SERVICES

Certificate of Analysis

CLIENT INFORMATION

Attention:	Jim Barrett
Client Name:	Golder Associates
Project:	973-6825
Project Desc:	
Address:	400 Commercial Street Manchester, New Hampshire 03101
Fax Number:	603-668-1199
Phone Number:	603-668-0880

LABORATORY INFORMATION

Contact:	Dave Howell
Project:	AN971285
Date Received:	98/05/01
Date Reported:	98/05/12
Submission No.:	8E0039
Sample No.:	019015-019020

NOTES: *'-' = not analysed '<' = less than Method Detection Limit (MDL) 'NA' = no data available*
LOQ can by determined for all analytes by multiplying the appropriate MDL X 3.33
Solids data is based on dry weight except for biota analyses.
Organic analyses are not corrected for extraction recovery standards except for isotope dilution methods, (i.e. CARB 429 PAH, all PCDD/F and DBD/DBF analyses)

Methods used by PASC are based upon those found in 'Standard Methods for the Examination of Water and Wastewater', Seventeenth Edition. Other methods are based on the principles of MISA or EPA methodologies. New York State: ELAP Identification Number 10756.

All work recorded herein has been done in accordance with normal professional standards using accepted testing methodologies, quality assurance and quality control procedures except where otherwise agreed to by the client and testing company in writing. Any and all use of these test results shall be limited to the actual cost of the pertinent analysis done. There is no other warranty expressed or implied. Your samples will be retained at PASC for a period of three weeks from receipt of data or as per contract.

COMMENTS:

Certified by:

PHILIP ANALYTICAL SERVICES CORPORATION
5555 North Service Road, Burlington, Ontario, Canada L7L 5H7 Tel: (905) 332-0778 Fax: (905) 332-1169

	Client ID:		Method Blank	Method Blank	Method Blank	Method Blank	Method Blank
	Lab No.:		019015 98	019015 98	019015 98	019015 98	019015 98
	Date Sampled:		98/04/30	98/04/30	98/04/30	98/04/30	98/04/30
Component	**MDL**	**Units**		Duplicate	M. Spike	MS % Rec.	MS Dup
Chloromethane	1.0	ug/L	<	NA	42	83	-
Vinyl Chloride	0.7	"	<	NA	42	85	-
Bromomethane	0.6	"	<	NA	43	86	-
Chloroethane	1.0	"	<	NA	47	95	-
Trichlorofluoromethane	1.8	"	<	NA	43	86	-
1,1-Dichloroethylene	0.6	"	<	NA	49	98	-
Methylene chloride	0.7	"	5.6	NA	52	100	-
trans-1,2-Dichloroethylene	1.6	"	<	NA	50	99	-
1,1-Dichloroethane	0.5	"	<	NA	49	98	-
cis-1,2-Dichloroethylene	0.6	"	<	NA	51	100	-
Chloroform	0.4	"	<	NA	48	96	-
1,1,1-Trichloroethane	0.3	"	<	NA	48	97	-
1,2-Dichloroethane	0.7	"	<	NA	47	94	-
Carbon tetrachloride	0.3	"	<	NA	45	91	-
Benzene	0.3	"	<	NA	48	95	-
1,2-Dichloropropane	0.5	"	<	NA	48	95	-
Trichloroethylene	0.3	"	<	NA	49	98	-
Bromodichloromethane	0.5	"	<	NA	48	96	-
2-Chloroethylvinyl ether	1.5	"	<	NA	46	91	-
cis-1,3-Dichloropropylene	1.0	"	<	NA	49	97	-
trans-1,3-Dichloropropylene	1.0	"	<	NA	49	98	-
Toluene	0.4	"	<	NA	48	96	-
1,1,2-Trichloroethane	0.4	"	<	NA	48	97	-
Chlorodibromomethane	0.6	"	<	NA	51	100	-
Ethylene Dibromide	0.4	"	<	NA	49	97	-
Tetrachloroethylene	0.4	"	<	NA	49	98	-
Chlorobenzene	0.3	"	<	NA	49	98	-
Ethylbenzene	0.3	"	<	NA	48	97	-
m&p-Xylene	0.8	"	<	NA	99	99	-
Bromoform	0.5	"	<	NA	51	100	-
Styrene	0.4	"	<	NA	50	100	-
o-Xylene	0.4	"	<	NA	48	96	-
1,1,2,2-Tetrachloroethane	0.6	"	<	NA	48	96	-
1,2-Dichlorobenzene	0.3	"	<	NA	51	100	-
1,3-Dichlorobenzene	0.4	"	<	NA	51	100	-
1,4-Dichlorobenzene	0.4	"	<	NA	49	97	-
Surrogate Recoveries		%					
d4-Dichloroethane			88	NA	95	95	-
d8-Toluene			95	NA	99	99	-
Bromofluorobenzene			94	NA	106	106	-
pH			7.00	-	-	-	-

	Client ID:		Method Blank	Method Blank	Method Blank	Method Blank	Method Blank
	Lab No.:		019015 98	019015 98	019015 98	019015 98	019015 98
	Date Sampled:		98/04/30	98/04/30	98/04/30	98/04/30	98/04/30
Component	**MDL**	**Units**		Duplicate	M. Spike	MS % Rec.	MS Dup
Naphthalene	0.3	ug/L	<	NA	13	66	14
Acenaphthylene	0.4	"	<	NA	14	70	14
Acenaphthene	0.7	"	<	NA	14	72	14
Fluorene	0.3	"	<	NA	15	77	15
Phenanthrene	0.3	"	<	NA	16	81	16
Anthracene	0.3	"	<	NA	15	76	15
Fluoranthene	0.2	"	<	NA	14	71	15
Pyrene	0.3	"	<	NA	19	97	17
Benz(a)anthracene	0.2	"	<	NA	16	82	16
Chrysene	0.3	"	<	NA	17	83	17
Benzo(b)fluoranthene	0.4	"	<	NA	17	85	16
Benzo(k)fluoranthene	0.4	"	<	NA	21	110	20
Benzo(a)pyrene	0.5	"	<	NA	18	88	16
Indeno(1,2,3-cd)pyrene	0.6	"	<	NA	13	64	14
Dibenzo(ah)anthracene	0.4	"	<	NA	14	68	14
Benzo(ghi)perylene	0.4	"	<	NA	15	77	15
Surrogate Recoveries		%					
d5-Nitrobenzene			75	NA	80	80	79
2-Fluorobiphenyl			57	NA	72	72	71
d14-p-Terphenyl			91	NA	85	85	82

Component	MDL	Units	Method Blank	909-MW9	880-MW11	880 MW11FD	880-MW6
Client ID:			Method Blank	909-MW9	880-MW11	880 MW11FD	880-MW6
Lab No.:			019015 98	019016 98	019017 98	019018 98	019019 98
Date Sampled:			98/04/30	98/04/30	98/04/30	98/04/30	98/04/30
Chloromethane	1.0	ug/L	-	<	<	<	<
Vinyl Chloride	0.7	"	-	<	<	<	<
Bromomethane	0.6	"	-	<	<	<	<
Chloroethane	1.0	"	-	<	<	<	<
Trichlorofluoromethane	1.8	"	-	<	<	<	<
1,1-Dichloroethylene	0.6	"	-	<	<	<	<
Methylene chloride	0.7	"	-	4.9	4.9	4.0	4.2
trans-1,2-Dichloroethylene	1.6	"	-	<	<	<	<
1,1-Dichloroethane	0.5	"	-	<	<	<	<
cis-1,2-Dichloroethylene	0.6	"	-	<	<	<	<
Chloroform	0.4	"	-	<	<	<	<
1,1,1-Trichloroethane	0.3	"	-	<	<	<	<
1,2-Dichloroethane	0.7	"	-	<	<	<	<
Carbon tetrachloride	0.3	"	-	<	<	<	<
Benzene	0.3	"	-	<	<	<	<
1,2-Dichloropropane	0.5	"	-	<	<	<	<
Trichloroethylene	0.3	"	-	<	<	<	<
Bromodichloromethane	0.5	"	-	<	<	<	<
2-Chloroethylvinyl ether	1.5	"	-	<	<	<	<
cis-1,3-Dichloropropylene	1.0	"	-	<	<	<	<
trans-1,3-Dichloropropylene	1.0	"	-	<	<	<	<
Toluene	0.4	"	-	<	<	<	<
1,1,2-Trichloroethane	0.4	"	-	<	<	<	<
Chlorodibromomethane	0.6	"	-	<	<	<	<
Ethylene Dibromide	0.4	"	-	<	<	<	<
Tetrachloroethylene	0.4	"	-	<	<	<	<
Chlorobenzene	0.3	"	-	<	<	<	<
Ethylbenzene	0.3	"	-	<	<	<	<
m&p-Xylene	0.8	"	-	<	<	<	<
Bromoform	0.5	"	-	<	<	<	<
Styrene	0.4	"	-	<	<	<	<
o-Xylene	0.4	"	-	<	<	<	<
1,1,2,2-Tetrachloroethane	0.6	"	-	<	<	<	<
1,2-Dichlorobenzene	0.3	"	-	<	<	<	<
1,3-Dichlorobenzene	0.4	"	-	<	<	<	<
1,4-Dichlorobenzene	0.4	"	-	<	<	<	<
Surrogate Recoveries		%					
d4-Dichloroethane			-	88	93	90	91
d8-Toluene			-	96	93	98	96
Bromofluorobenzene			-	96	97	95	96
pH			-	2.00	2.00	2.00	2.00

	Client ID:		Method Blank	909-MW9	880-MW11	880 MW11FD	880-MW6
	Lab No.:		019015 98	019016 98	019017 98	019018 98	019019 98
	Date Sampled:		98/04/30	98/04/30	98/04/30	98/04/30	98/04/30
Component	**MDL**	**Units**	MSD % Rec.				
Naphthalene	0.3	ug/L	72	-	-	-	<
Acenaphthylene	0.4	"	68	-	-	-	<
Acenaphthene	0.7	"	71	-	-	-	<
Fluorene	0.3	"	73	-	-	-	<
Phenanthrene	0.3	"	79	-	-	-	<
Anthracene	0.3	"	74	-	-	-	<
Fluoranthene	0.2	"	75	-	-	-	<
Pyrene	0.3	"	83	-	-	-	<
Benz(a)anthracene	0.2	"	80	-	-	-	<
Chrysene	0.3	"	83	-	-	-	<
Benzo(b)fluoranthene	0.4	"	80	-	-	-	<
Benzo(k)fluoranthene	0.4	"	100	-	-	-	<
Benzo(a)pyrene	0.5	"	81	-	-	-	<
Indeno(1,2,3-cd)pyrene	0.6	"	69	-	-	-	<
Dibenzo(ah)anthracene	0.4	"	72	-	-	-	<
Benzo(ghi)perylene	0.4	"	77	-	-	-	<
Surrogate Recoveries		%					
d5-Nitrobenzene			79	-	-	-	81
2-Fluorobiphenyl			71	-	-	-	73
d14-p-Terphenyl			82	-	-	-	92

	Client ID:		880-Trip Blank
	Lab No.:		019020 98
	Date Sampled:		98/04/30
Component	**MDL**	**Units**	
Chloromethane	1.0	ug/L	<
Vinyl Chloride	0.7	"	<
Bromomethane	0.6	"	<
Chloroethane	1.0	"	<
Trichlorofluoromethane	1.8	"	<
1,1-Dichloroethylene	0.6	"	<
Methylene chloride	0.7	"	4.0
trans-1,2-Dichloroethylene	1.6	"	<
1,1-Dichloroethane	0.5	"	<
cis-1,2-Dichloroethylene	0.6	"	<
Chloroform	0.4	"	<
1,1,1-Trichloroethane	0.3	"	<
1,2-Dichloroethane	0.7	"	<
Carbon tetrachloride	0.3	"	<
Benzene	0.3	"	<
1,2-Dichloropropane	0.5	"	<
Trichloroethylene	0.3	"	<
Bromodichloromethane	0.5	"	<
2-Chloroethylvinyl ether	1.5	"	<
cis-1,3-Dichloropropylene	1.0	"	<
trans-1,3-Dichloropropylene	1.0	"	<
Toluene	0.4	"	<
1,1,2-Trichloroethane	0.4	"	<
Chlorodibromomethane	0.6	"	<
Ethylene Dibromide	0.4	"	<
Tetrachloroethylene	0.4	"	<
Chlorobenzene	0.3	"	<
Ethylbenzene	0.3	"	<
m&p-Xylene	0.8	"	<
Bromoform	0.5	"	<
Styrene	0.4	"	<
o-Xylene	0.4	"	<
1,1,2,2-Tetrachloroethane	0.6	"	<
1,2-Dichlorobenzene	0.3	"	<
1,3-Dichlorobenzene	0.4	"	<
1,4-Dichlorobenzene	0.4	"	<
Surrogate Recoveries		%	
d4-Dichloroethane			89
d8-Toluene			96
Bromofluorobenzene			93
pH			2.00

			880-Trip
	Client ID:		Blank
	Lab No.:		019020 98
	Date Sampled:		98/04/30
Component	**MDL**	**Units**	
Naphthalene	0.3	ug/L	-
Acenaphthylene	0.4	"	-
Acenaphthene	0.7	"	-
Fluorene	0.3	"	-
Phenanthrene	0.3	"	-
Anthracene	0.3	"	-
Fluoranthene	0.2	"	-
Pyrene	0.3	"	-
Benz(a)anthracene	0.2	"	-
Chrysene	0.3	"	-
Benzo(b)fluoranthene	0.4	"	-
Benzo(k)fluoranthene	0.4	"	-
Benzo(a)pyrene	0.5	"	-
Indeno(1,2,3-cd)pyrene	0.6	"	-
Dibenzo(ah)anthracene	0.4	"	-
Benzo(ghi)perylene	0.4	"	-
Surrogate Recoveries		%	
d5-Nitrobenzene			-
2-Fluorobiphenyl			-
d14-p-Terphenyl			-

CHAIN OF CUSTODY

PHILIP ANALYTICAL SERVICES

ZENON LABORATORIES

5555 North Service Road
Burlington, Ontario L7L 5H7

Toll Free: (800) 668-0639
Tel: (905) 332-8788
Fax: (905) 332-9169

Page 1 of 2

CLIENT INFORMATION

Company Name: GOLDER ASSOC INC
Project Manager: J. BARRETT
Address: 400 COMMERCIAL ST
MANCHESTER, NH 03101
Phone #: 603-668-0880 Fax #: 603-668-1199
Storage: COOLER
Sampled by: SCOTT CHAPMAN

ANALYSIS REQUESTED

Zenon Use Only	Field Sample ID	# Bottles	Matrix	Date	Time	PNA	VOLATILES	VOC	Level of contamination (low, high, unknown)
	MW-1-888	#5	WATER	12-15-97	1525	✓	✓		U
	MW-2-888	#5	WATER	12-15-97	1535	✓	✓		U
	MW-3-888	#5	WATER	12-15-97	1545	✓	✓		U
	MW-4-888	5	WATER	12-15-97	1600	✓	✓		U
	MW-1-880	2	SOIL	12-12-97	0950	✓		✓	U
	MW-10-880	2	"	12-12-97	1335	✓		✓	U
	MW-2-880	2	"	12-16-97	1020	✓		✓	U
	MW-2-880 (DUPLICATE)	2	"	12-16-97	1020	✓		✓	U
	MW-3-880	2	"	12-16-97	1200	✓		✓	U
	MW-5-880	2	"	12-16-97	1440	✓		✓	U

TAT (Turnaround Time)

RUSH TAT MUST HAVE PRIOR APPROVAL

**some exceptions apply please contact Lab*

- STD 10 Business Days ☒
- RUSH 5 Business Days ☐
- RUSH 2 Business Days ☐
- RUSH 1 Business Day ☐
- Other Business Days ____

PROJECT INFORMATION

Project #: 973-6825-002
Site: 477888/880
PO#:
Zenon Quote #:
Zenon Project #:
Zenon Contact:

SPECIAL DETECTION LIMITS

MISA ☐

SPECIAL REQUIREMENTS / REGULATIONS

REMARKS

Client Signature: Scott Chapman
Affiliation: GAI
Date/Time: 12-17-97 / 2200

Received By:
Affiliation:
Date/Time:

Rec'd By:
Storage Loc.:
Date/Time

WHITE - LAB / YELLOW - CLIENT

SEE OVER FOR COMPLETION & SAMPLING INSTRUCTIONS

CHAIN OF CUSTODY

PHILIP ANALYTICAL SERVICES

ZENON LABORATORIES

5555 North Service Road
Burlington, Ontario L7L 5H7

Toll Free: (800) 668-0639
Tel: (905) 332-8788
Fax: (905) 332-9169

CLIENT INFORMATION

Company Name: Golder Assoc Inc
Project Manager: J. Barrett
Address: 400 Commercial St
Manchester, NH 03101
Phone #: 603-668-0880 Fax #: 603-668-1199
Storage: Cooler Sampled by: Scott Chapman

ANALYSIS REQUESTED

Zenon Use Only	Field Sample ID	# Bottles	Matrix	Date	Time	PNA	VOC	Level of contamination (low, high, unknown)
	MW-12-880	2	SOIL	12-17-97	1020	✓	✓	U
	MW-11-880	2	"	12-17-97	1140	✓	✓	U
	MW-6-880	2	"	12-17-97	1415	✓	✓	U
	MW-8-880	2	"	12-17-97	1555	✓	✓	U
	MW-8-880 (DUPLICATE)	2	"	12-17-97	1555	✓	✓	U

TAT (Turnaround Time)

RUSH TAT MUST HAVE PRIOR APPROVAL

*some exceptions apply please contact Lab

- STD 10 Business Days ☒
- RUSH 5 Business Days ☐
- RUSH 2 Business Days ☐
- RUSH 1 Business Day ☐
- Other Business Days ____

PROJECT INFORMATION

Project #: 973-6825-002
Site: 477 0880/888
PO#:
Zenon Quote #:
Zenon Project #:
Zenon Contact:

SPECIAL DETECTION LIMITS

MISA ☐

SPECIAL REQUIREMENTS / REGULATIONS

REMARKS

Client Signature: Scott Chapman
Affiliation: GAI
Date/Time: 12-17-97 / 2200

Received By:
Affiliation:
Date/Time:

Rec'd By:
Storage Loc.:
Date/Time

WHITE - LAB / YELLOW - CLIENT

SEE OVER FOR COMPLETION & SAMPLING INSTRUCTIONS

CHAIN OF CUSTODY

PHILIP ANALYTICAL SERVICES

ZENON LABORATORIES

5555 North Service Road
Burlington, Ontario L7L 5H7

Toll Free: (800) 668-0639
Tel: (905) 332-8788
Fax: (905) 332-9169

Page 1 of 1

CLIENT INFORMATION

Company Name: Golder Associates
Project Manager: Jim Barrett
Address: 400 Commercial St.
Manchester, NH 03101
Phone #: (603) 668-0880 Fax #: (603) 668-1199
Storage: ICE COOLER
Sampled by: David Cedarholm

ANALYSIS REQUESTED

Zenon Use Only	Field Sample ID	# Bottles	Matrix	Date	Time	VOC	PNA	Level of contamination (low, high, unknown)
	909-MW7	3	GW	4/8/98	0920	2	1	
	908-MW6	3	GW	4/8/98	0940	2	1	
	908-MW11	3	GW	4/8/98	0955	2	1	
	TRIP BLANK 908-TB	2	W			2		
	880-MW1	3	GW	4/8/98	1740	2	1	
	880-MW3	3	GW	4/8/98	1750	2	1	
	880-MW2	3	GW	4/8/98	1900	2	1	
	880-MW5	3	GW	4/8/98	1810	2	1	

TAT (Turnaround Time)

RUSH TAT MUST HAVE PRIOR APPROVAL

**some exceptions apply please contact Lab*

- STD 10 Business Days ☑
- RUSH 5 Business Days ☐
- RUSH 2 Business Days ☐
- RUSH 1 Business Day ☐
- Other Business Days ____

PROJECT INFORMATION

Project #: 973-6825.200
Site: 4770909, 908, 880
PO#:
Zenon Quote #:
Zenon Project #:
Zenon Contact: Mary Anne Johnson

SPECIAL DETECTION LIMITS

MISA ☐

SPECIAL REQUIREMENTS / REGULATIONS

REMARKS

Client Signature: David Cedarholm
Affiliation: Golder Associates
Date/Time: 4/9/98 1830

Received By:
Affiliation:
Date/Time:

Rec'd By:
Storage Loc.:
Date/Time

WHITE - LAB / YELLOW - CLIENT

SEE OVER FOR COMPLETION & SAMPLING INSTRUCTIONS

CHAIN OF CUSTODY

PHILIP ANALYTICAL SERVICES

ZENON LABORATORIES

5555 North Service Road
Burlington, Ontario L7L 5H7

Toll Free: (800) 668-0639
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CLIENT INFORMATION

Company Name: Golder Associates
Project Manager: Jim Barrett
Address: 400 Commercial St.
Manchester, NH 03101
Phone #(603)668-0880 Fax #:(603)668-1199
Storage: ICE COOLER
Sampled by: David Cedarholm

ANALYSIS REQUESTED

Zenon Use Only	Field Sample ID	# Bottles	Matrix	Date	Time	VOC	PNA	Level of contamination (low, high, unknown)
	880-MW7	3	GW	4/9/98	0930	2	1	
	880-MW8	3	GW	4/9/98	0940	2	1	
	880-MW9	3	GW	4/9/98	0950	2	1	
	880-MW10	3	GW	4/9/98	1000	2	1	
	880-MW12	3	GW	4/9/98	1010	2	1	
	910-MW#1	3	GW	4/9/98	1030	2	1	
	910-MW2	3	GW	4/9/98	1040	2	1	
	910-MW3	3	GW	4/9/98	1050	2	1	
	910-TB TRIP BLANK	2	W			2		

TAT (Turnaround Time)

RUSH TAT MUST HAVE PRIOR APPROVAL

*some exceptions apply please contact Lab

- STD 10 Business Days ☑
- RUSH 5 Business Days ☐
- RUSH 2 Business Days ☐
- RUSH 1 Business Day ☐
- Other Business Days ____

PROJECT INFORMATION

Project #: 773-6825.200
Site: 47-0880, 910
PO#:
Zenon Quote #:
Zenon Project #:
Zenon Contact: Mary Anne Johnson

SPECIAL DETECTION LIMITS

MISA ☐

SPECIAL REQUIREMENTS / REGULATIONS

REMARKS

Client Signature: David Cedarholm
Affiliation: Golder Assoc.
Date/Time: 4/9/98 1830

Received By:
Affiliation:
Date/Time:

Rec'd By:
Storage Loc.:
Date/Time

WHITE - LAB / YELLOW - CLIENT

SEE OVER FOR COMPLETION & SAMPLING INSTRUCTIONS

APPENDIX F
PHASE I ESA EXECUTIVE SUMMARY

Heindel and Noyes
P.O. Box 64709 Burlington, Vermont 05406-4709
• Consulting Hydrogeologists
• Engineers
• Environmental Scientists
802-658-0820
Fax 802-860-1014

CV PROPERTIES, INC. PIN 4770880
SOUTH OF WALL STREET
Northfield, Vermont

Phase I Environmental Site Assessment

EXECUTIVE SUMMARY

In March, 1997 Heindel & Noyes (H&N) completed a Phase I Environmental Site Assessment (ESA) on a parcel of land south of Wall Street in Northfield, Vermont known by Canadian National Real Estate Management (CNREM) as PIN 4770880 and owned by CV Properties, Inc. The purpose of the ESA was to identify areas of potential concern at the subject site prior to sale of the property for future commercial use.

PIN 4770880 is an 8.55 acre property in Northfield, Vermont bordered on the north by Wall Street, on the west by the Dog River, on the south by open land, and on the east by the Central Vermont Railway railroad right of way (now operated by New England Central Railway). The site is leased to five different tenants: Northfield Fuels, Gillespie Fuels, Northfield Telephone Company, Thurstons Market, and Northfield Wood Products. All structures on the property were inspected, except for the residential apartment on the second floor of Thurstons Market.

Based on the site conditions at the time of our inspection and our research, it is our conclusion that the subject site (PIN 4770880) may have been impacted by the historic and current uses of the subject property. The following environmental factors were identified:

1. On the subject property is Northfield Fuels, a state-designated active hazardous waste site. This is a bulk fuel distributor, which had a leaking 1000-gallon diesel fuel underground storage tank (UST) removed from the site in 1995. Excavated contaminated soil is presently stockpiled on site while natural processes biodegrade the contaminant present (diesel fuel). No USTs are on site. Soil staining was noted at the inlet pipes to the bulk storage tanks and at the delivery truck filling tower. This facility is a potential source of contamination, due to the large volume of petroleum products stored and transferred on the property;

2. There is a second bulk fuel distributor, Gillespie Fuels, also located on the subject property. According to the owner, the facility has had no spills or releases since 1969 when it went into the petroleum product distribution business. No USTs are on site; all fuels are stored in above-ground storage tanks (ASTs). Soil staining was noted at the delivery truck filling tower, at the waste oil storage tank, and in an area where 55 gallon drums containing waste oil are stored. A fresh kerosine spill was noted in front of the kerosine tank located in the scale house. This facility is a potential source of contamination, due to the large volume of petroleum products stored and transferred on the property;

3. Next to Gillespie Fuels is the Northfield Telephone Company line maintenance depot. None of the current activities in the Northfield Telephone building pose any environmental hazards. However, this building was built on the site of Stoddard Enterprises a wood preserving business from 1955 to 1959. This location was designated as a state active hazardous waste site and CERCLIS site. No remediation activities have taken place other than a preliminary site assessment completed in 1988;

4. Northfield Wood Products is a Small Quantity RCRA Hazardous Waste Generator due to their use of wood lacquers. These lacquers are highly volatile; emissions from this facility are primarily air emissions. Two to three 55-gallon drums per year of solidified lacquer are disposed of as hazardous waste by a licensed waste hauler. Lacquer stock, solvent, and solid waste lacquer are kept in a dedicated hazardous materials storage building with a diked concrete floor. The materials in this building are stored in a neat and responsible manner. As long as current good storage practices continue, H&N sees no environmental threat to soil, groundwater, or surface water from these materials;

5. The subject property has been the site of railroad activity and is bordered by a railroad right of way since the mid-1800s. Historical maps show multiple side tracks, now mostly removed or inactive in the interior of the subject property; potential contamination associated with railroads includes polycyclic aromatic hydrocarbons (PAHs), which are the byproducts of the combustion of coal, wood, and fossil fuels; petroleum hydrocarbons from maintenance activities; and herbicides, which are used to control weed growth in railroad rights of way;

6. One of the buildings on the property is the earthen-floored, former locomotive house for CVR. According to Tom Faucett, CNREM, the possible oil-change trench in the floor (as suggested by tenant Dexter Landers) was probably used only to inspect locomotives and/or to dump ashes from the wood and coal fuel used at that time, and not to change or dump oil;

7. Coal storage facilities were on the site until the 1970s. Oil bulk storage tanks have been in continuous use on the property since as early as 1910;

8. The property has been industrial (multiple granite working businesses, lumber mills, a cannery, a meat packing house) and railroad use since at least 1873, the date of the earliest maps;

9. The adjacent property to the north (CNREM PIN 4770881, North of Wall Street) was also the location of railroad activity (coal and cord wood storage, rail car house and roundhouse) a number of granite working businesses, and, according to early historic maps, a gasoline underground storage tank (UST) and a gasoline storage shed. The gasoline storage shed and UST are not shown in the 1910 and later Sanborn Maps. This adjacent site appears to be down-gradient of the subject property;

10. The other tenants (Thurstons Market and Northfield Telephone Company Accounting Office) on the subject property do not appear to pose any environmental concern.

APPENDIX G
EIS DATA ENTRY FORM

EIS DATA ENTRY FORM

PIN: 4770880

Mile Roxbury Subdivision
Northfield, Vermont

Public Affairs Issue?(Y/N): N

Initiator: Mark Cyar

Action code: PR3

Phase code: PH2

Phase start date: 1997/12

Estimated completion date: 1998/06

Phase end date: 1998/06

Reason code: PSA

Consultant: Golder Associates

Budget: $XXXX U.S. Dollars

Cost: $

Consultant start date: December 1997

Draft due date: July 1998

Consultant completion date: July 1998

Phase facts:

- Subject property is approximately 8.55 acres in size and is located on the Roxbury Subdivision in Northfield, Vermont. Subject property is owned by Central Vermont Properties, Inc.
- Subject property is bounded by Wall Street on the north, NECR tracks on the east, a vacant field to the south, and the Dog River to the west.
- Subject property historically contained a railroad operations (engine house, freight storage), bulk coal and fuel distribution with several ASTs, granite working companies, a cannery, several lumber companies, a wood preservation company, telephone company offices, and a small grocery store. The property was initially developed prior to 1873, possibly as early as 1840. Two 1000-gallon USTs have been removed from the property in recent years. Access to the subject property is via Wall Street on the northern end of the property.
- PIN 4770880 is currently leased to several tenants: Northfield Wood Products, Dave Hayden (Northfield Fuels), Gillespie Fuels, Northfield Telephone Co., and Allen Thurston (Thurston's Market)
- Areas of potential environmental concern (APECs) addressed by this Phase II ESA include:
  - Bulk fuel (coal and oil) storage and ASTs,
  - A former lumber operation,
  - A former wood preserving business,
  - Former underground storage tanks (USTs),
  - A lacquer storage building,
  - Stockpiled oil-stained soils, and
  - Former railroad activity on the subject property.
- Drilled and sampled subsurface soils at eleven (11) locations. Permanent monitoring wells were installed in each of the borings (designated 880-MW1 through 880-MW12, excluding 880-MW4).
- Generalized site geology consists of interfingering sand, silty sand and gravel overlying a shallow bedrock surface. Soil borings 880-MW11 and 880-MW6 were advanced to 27 and 22 feet bg, respectively, before contacting bedrock. Boring 880-MW7 was advanced to 14 feet bg without contacting bedrock. All other borings encountered bedrock at depths of less than 15 feet.
- Groundwater was encountered in the monitoring wells at depths ranging from less than one (1) foot bg to approximately 6 feet bg. Groundwater elevations suggest a west-northwesterly flow direction toward the Dog River.
- Hydraulic conductivity was estimated at 0.283 feet/day based on grain-size analysis. Average linear groundwater flow velocity is estimated at 0.065 feet/day.
- Field observations and organic vapor monitor readings indicated little impact in most portions of the site. Maximum organic vapor readings of 94 ppm and 82 ppm were recorded during the drilling of borings 880-MW7 and 880-MW9, respectively. All other PID readings were less than 5 ppm.

- Laboratory analysis of soil samples indicated the presence of PNAs in surface soils and several subsurface soil samples, but generally at concentrations below VTDEC Enforcement Standards. The benzo(a)pyrene concentration in surface sample 880-SS1 (0.79 mg/Kg) exceeded the VTDEC Enforcement Standard of 0.78 mg/Kg.
- The groundwater sample from well 880-MW8 contained a concentration of benzo(a)anthracene (0.5 µg/L) which exceeded the VTDEC Enforcement Standard. The groundwater sample from well 880-MW9 contained concentrations of dichlorobromomethane (3.5 µg/L) and 1,1,2-trichloroethane (5.8 µg/L) which exceeded applicable VTDEC Enforcement Standards. No other exceedences of enforcement standards were observed.
- Concerns about contaminant migration and physical receptors is minimized by the industrial nature of the site and the lack of use of shallow groundwater for on-site or off-site purposes. Direct contact between impacted soil or groundwater and potential human receptors is currently unlikely. The downgradient extent of groundwater impact is not known and impacts to the Dog River are unknown.